MAY 2 8 1945

VOLUME 69 NUMBER 4

AMERICAN JOURNAL

OF

DISEASES OF CHILDREN

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APRIL 1945

PUBLISHED MONTHLY BY AMERICAN MEDICAL ASSOCIATION, 535 NORTH DEARBORN STREET, CHICAGO 10, ILLINOIS. ANNUAL SUBSCRIPTION, $8.00

Entered as Second Class Matter Jan. 4, 1911, at the Postoffice at Chicago, Under the Act of Congress of March 3, 1879

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VOLUME 69 APRIL 1945 NUMBER 4

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BLOOD PRESSURES IN CHILDREN BETWEEN THE AGES OF FIVE AND SIXTEEN YEARS

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AND
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AND
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In spite of all the work that has been done to determine what is normal blood pressure for various ages, too little has been done with reference to the blood pressures of children. Several series of children have been studied, but the age groups were rather small for good statistical study. Furthermore, in most instances the work was done by several examiners not always using the same technic.

The present study is unique for several reasons. It is based on 25,000 determinations of blood pressure made by one physician with a constant technic and under identical circumstances on 3,580 school children living in a small city. The children have been followed year by year from the age of 5 to that of 16 years.

For several hundred children in this series ten or more annual readings of blood pressure were made. A comparative analysis of the individual changes in the blood pressure of these children with reference to increasing age, together with

TABLE 1.—*Distribution of Systolic Blood Pressures According to Age*

Systolic Blood Pressure, Mm. Hg	Age in Years											
	5	6	7	8	9	10	11	12	13	14	15	16
200	..	..	..	..	..	..	..	..	..	..	1	1
195-199	..	..	..	..	..	..	..	..	..	..	..	..
190-194	..	..	..	..	..	..	..	..	..	..	..	..
185-189	..	..	..	..	..	..	..	..	..	..	..	..
180-184	..	..	..	..	..	..	..	..	..	..	2	1
175-179	..	..	..	..	..	..	..	..	1	..	..	..
170-174	..	..	..	..	..	..	..	..	1	2	1	1
165-169	..	..	..	..	..	..	..	..	..	..	3	1
160-164	..	..	..	..	..	..	3	1	1	4	2	2
155-159	..	..	..	..	..	..	..	1	1	1	2	1
150-154	1	..	..	..	..	..	1	..	3	7	2	5
145-149	..	..	..	..	..	1	3	5	6	5	9	11
140-144	..	..	..	1	..	5	10	21	30	36	44	39
135-139	..	..	..	4	3	8	20	32	38	49	56	49
130-134	2	5	3	7	19	28	41	67	90	103	100	101
125-129	..	4	4	20	30	45	73	83	117	190	213	154
120-124	2	14	20	46	71	120	150	260	365	427	430	319
115-119	4	20	48	56	91	145	206	306	412	378	346	239
110-114	33	111	217	402	553	759	896	1,045	847	656	373	304
105-109	81	292	429	590	563	510	460	403	264	144	55	16
100-104	153	411	533	518	483	442	323	230	129	63	13	10
95- 99	240	349	310	267	191	158	97	62	40	22	5	4
90- 94	618	426	301	212	158	92	51	50	33	8	..	1
85- 89	261	41	31	20	10	4	..	6	5	1	..	..
80- 84	81	10	15	3	3	3	1	2	..	..	..	..
75- 79	..	..	..	..	..	..	..	1	..	..	..	..
70- 74	..	1	..	..	1	..	..	..	..	..	..	..
Total	1,470	1,684	1,911	2,076	2,176	2,320	2,335	2,575	2,388	2,096	1,657	1,259
Mean	98.9	100.0	102.2	104.7	106.5	108.6	110.9	112.7	115.2	117.9	120.8	121.4
Standard Deviation	7.04	7.47	7.49	7.86	7.97	8.20	8.57	8.84	9.27	9.32	9.35	9.68

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This work was aided by a grant to Dr. Graham from the Macy Foundation.

Dr. Walter C. Alvarez, of the Mayo Clinic, gave advice concerning this study.

TABLE 2.—*Distribution of Diastolic Blood Pressures According to Age*

Diastolic Blood Pressure, Mm. Hg	Age in Years											
	5	6	7	8	9	10	11	12	13	14	15	16
95-99	..	..	..	..	..	..	1	..	..	..	..	..
90-94	..	..	..	..	..	..	2	..	..	..	..	..
85-89	1	..	1	..	1	..	..	1	2	3	..	3
80-84	1	..	..	2	2	1	6	6	3	10	9	4
75-79	..	..	..	..	2	2	2	4	4	3	10	7
70-74	2	2	1	11	20	20	22	13	27	40	17	21
65-69	16	28	30	61	64	108	122	188	205	276	290	237
60-64	141	173	215	305	374	501	623	757	811	795	655	550
55-59	370	471	600	625	666	699	724	679	629	519	401	294
50-54	568	598	649	601	592	525	424	389	302	229	185	125
45-49	48	4	2	6	2	2	2	2	2	..	..	1
40-44	2	..	..	1	..	..	..	2	1	1	1	2
35-39	..	2	..	1	1	1	..	2	1	2	..	1
30-34	..	..	..	1	..	..	..	..	..	..	..	..
Total	1,149	1,278	1,498	1,614	1,724	1,859	1,928	2,043	1,987	1,878	1,568	1,245
Mean	54.9	55.5	55.8	56.5	57.0	57.7	58.5	59.0	59.6	60.5	60.8	61.1
Standard Deviation	4.33	4.05	4.00	4.74	4.73	4.76	4.99	4.94	4.87	5.19	5.13	5.19

TABLE 3.—*Percentage Distribution of Blood Pressure of Boys*

Age	Number of Subjects	Diastolic Blood Pressure, Mm. Hg	Systolic Blood Pressure, Mm. Hg						
			80-89	90-99	100-109	110-119	120-129	130-139	140-149	Total
5 yr.	557	40-49	2	1	..	..	..	..	..	3
		50-59	13	53	14	2	..	..	..	82
		60-69	2	8	4	1	..	..	..	15
		Total	17	62	18	3	..	..	..	100
6 yr.	636	50-59	2	36	40	5	..	..	..	83
		60-69	..	6	6	4	1	..	..	17
		Total	2	42	46	9	1	..	..	100
7 yr.	733	50-59	1	24	47	11	..	..	..	83
		60-69	..	3	7	6	1	..	..	17
		Total	1	27	54	17	1	..	..	100
8 yr.	823	50-59	1	16	41	16	1	..	..	75
		60-69	..	3	8	10	3	1	..	25
		Total	1	19	49	26	4	1	..	100
9 yr.	857	50-59	..	10	40	20	1	..	..	71
		60-69	..	2	10	11	5	1	..	29
		Total	..	12	50	31	6	1	..	100
10 yr.	910	50-59	..	6	33	27	2	..	..	68
		60-69	..	1	9	17	4	1	..	32
		Total	..	7	42	44	6	1	..	100
11 yr.	973	50-59	..	4	28	27	2	..	..	61
		60-69	..	1	8	21	8	1	..	39
		Total	..	5	36	48	10	1	..	100
12 yr.	1,026	50-59	..	2	16	34	3	1	..	56
		60-69	..	..	6	26	8	3	1	44
		Total	..	2	22	60	11	4	1	100
13 yr.	906	50-59	..	1	11	33	7	..	..	52
		60-69	..	..	3	27	12	5	1	48
		Total	..	1	14	60	19	5	1	100
14 yr.	939	50-59	..	1	5	27	12	..	..	45
		60-69	..	..	3	26	18	5	1	53
		70-79	..	..	..	..	..	1	1	2
		Total	..	1	8	53	30	6	2	100
15 yr.	772	50-59	..	..	2	20	15	2	..	39
		60-69	..	..	1	22	26	8	3	60
		70-79	..	..	..	..	..	..	1	1
		Total	..	..	3	42	41	10	4	100
16 yr.	613	50-59	..	..	2	17	12	3	..	34
		60-69	..	..	..	24	26	12	3	65
		70-79	..	..	..	..	..	..	1	1
		Total	..	..	2	41	38	15	4	100

esponding data for a large group of adults, be presented in a later publication. Also, we later to be able to make a detailed report erning the blood pressure readings of this p of children in relation to associated dis- s of childhood.

MATERIAL AND METHOD

e measurements were made in the schools of Chis-, Minn., from 1926 to 1940 inclusive by one of us W. G.).

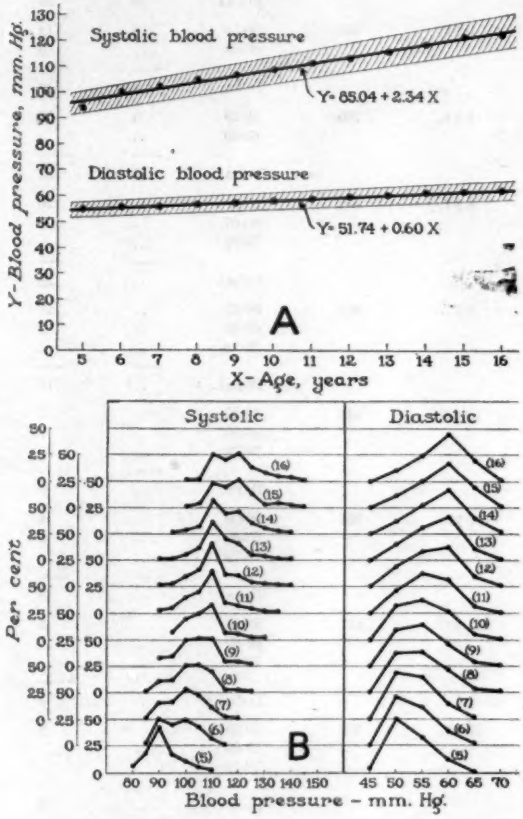
e technic used was as follows: The child was ed in a sitting position with the right forearm zontal on a table. A mercury manometer, which checked frequently for accuracy, was used. The was placed on the upper portion of the child's t arm. The arm bands were adjusted according to the of the arm so that not more than two thirds of upper part of the arm was covered by the cuff. arm band 12 cm. wide was used for the older children large arms and a band 9 cm. wide for most of other children. When the arm was very small, 12 cm. band was folded double and then placed the arm in the usual manner. If the child seemed ited or nervous about the procedure, the reading not taken until he was calm. Readings of blood ssure when the child was under tension would have n of value as indicating the psychic pressor effect. e such readings were not taken, however, the read- s recorded were not the highest obtainable but were bably between the low and the high of the range variability. Inasmuch as the same technic was used all the subjects, the data should be satisfactory for parative purposes, the fact that the figures do not lude the maximal pressor response being taken into sideration. The reading when the first persistent nd was heard with the stethoscope was recorded as systolic blood pressure, and the reading when the nd disappeared was recorded as the diastolic blood ssure.

RESULTS

The systolic and diastolic readings according age are presented in tables 1 and 2. Originally ese figures were divided on the basis of the sex; t since there was less than 1 unit of difference in e averages for each age, this information was itted from the final report. The average blood ssure for each age and the standard deviations the observations are given.

Chart *A* presents graphically the averages from bles 1 and 2. When the average blood pressure as plotted against age, a linear relationship was cognized. A best fitting straight line was fitted points for both systolic and diastolic blood ssures. The algebraic equation for each line as calculated by the method of least squares. he equations are given in the figure. The aded area above and below each line represents estimate of the region in which 50 per cent of e readings will fall.

Tables 3 and 4 show the percentage distribution of blood pressures by age for boys and girls respectively. In the first column under each age is given the number of children studied in determining the percentage distribution for that age group. For purposes of compactness the groupings of blood pressure are made somewhat broader than those in tables 1 and 2. The modal classes of blood pressure for each age and their relative frequency are presented. The modal systolic blood pressure ranged from 92 mm., at



A, average blood pressures of normal children 5 to 16 years of age. *B*, percentage distribution of blood pressures of normal children. The numbers in parentheses refer to ages.

the age of 5 years, to 122 mm., at the age of 16 years. The corresponding diastolic pressures ranged from 52 to 62 mm. The percentages for each age were adjusted so as to total 100 per cent. Readings of blood pressure beyond the limit included in these tables were obtained for about 0.5 per cent of the children.

Chart *B*, which is based on tables 3 and 4, presents graphically the percentage distribution.

COMMENT

These data concerning the incidence of various readings of blood pressure of children at different

ages are presented as basic information. The method of presentation of data in tables 3 and 4 seems especially noteworthy in that for the first time the incidence of systolic as compared with

puberty and continued during adolescence. variation of blood pressure was greater for at the ages of 10, 11, 12 and 13 years tha boys at these ages. This observation is in a

TABLE 4.—*Percentage Distribution of Blood Pressure of Girls*

Age	Number of Subjects	Diastolic Blood Pressure, Mm. Hg	Systolic Blood Pressure, Mm. Hg						
			80-89	90-99	100-109	110-119	120-129	130-139	140-149
5 yr.	592	40-49	3	2	..	..	..	..	..
		50-59	18	52	11	2	..	..	..
		60-69	2	5	4	1	..	..	..
		Total	23	59	15	3	..	..	..
6 yr.	642	50-59	2	44	34	5	1	..	..
		60-69	..	5	6	2	1	..	..
		Total	2	49	40	7	2	..	..
7 yr.	765	50-59	1	29	46	8	1	..	..
		60-69	..	3	7	4	1	..	..
		Total	1	32	53	12	2	..	..
8 yr.	791	50-59	..	20	45	14	..	..	..
		60-69	..	3	8	7	2	..	..
		70-79	..	..	..	..	1	..	..
		Total	..	23	53	21	3	..	..
9 yr.	867	50-59	..	13	40	20	2	..	..
		60-69	..	2	8	10	2	1	..
		70-79	..	..	..	..	1	1	..
		Total	..	15	48	30	5	2	..
10 yr.	949	50-59	..	7	31	26	2	..	..
		60-69	..	2	8	15	6	1	..
		70-79	..	..	..	..	1	1	..
		Total	..	9	39	41	9	2	..
11 yr.	955	50-59	..	4	21	32	1	..	..
		60-69	..	1	6	22	8	3	..
		70-79	..	..	..	..	1	1	..
		Total	..	5	27	54	10	4	..
12 yr.	1,017	50-59	..	3	13	27	6	..	..
		60-69	..	1	5	27	12	4	1
		70-79	..	..	..	..	..	1	..
		Total	..	4	18	54	18	5	1
13 yr.	991	50-59	..	2	8	24	8	1	..
		60-69	..	..	3	27	18	5	2
		70-79	..	..	..	..	..	1	1
		Total	..	2	11	51	26	7	3
14 yr.	939	50-59	..	..	5	19	10	1	1
		60-69	..	..	1	31	23	7	..
		70-79	..	..	..	..	1	1	..
		Total	..	..	6	50	34	9	1
15 yr.	796	50-59	..	..	3	20	11	1	..
		60-69	..	..	1	27	27	7	1
		70-79	..	..	..	..	..	1	1
		Total	..	..	4	47	38	9	2
16 yr.	632	50-59	..	..	1	19	12	2	..
		60-69	..	..	1	28	26	7	2
		70-79	..	..	..	..	..	1	1
		Total	..	..	2	47	38	10	3

that of diastolic readings at various ages is outlined in a manner that is easily understood.

There were an increase in mean blood pressure and an apparent increase in variability of blood pressure for the entire group with increasing age. These changes became especially evident at about

with the results of a study by one of us of blood pressure reactions of 400 school child to the cold pressor test.[1]

1. Hines, E. A.: Reaction of the Blood Pre of Four Hundred School Children to a Standard S ulus, J. A. M. A. **108**:1249-1250 (April 10) 1937.

t is obvious from the tables that much hyper-sion was observed, especially in regard to the tolic blood pressure. This subject will be en up in a subsequent paper.

SUMMARY

Twenty-five thousand determinations of the od pressure were made on 3,580 children from o 16 years of age inclusive. The readings re made by one physician, who followed children's progress for fifteen years. Suc-sive readings were recorded under the same umstances and by the use of the same technic. The tables based on the data show linear in-ase of blood pressure, both systolic and dias-c, with each year of age. The average blood pressure readings for both sexes at each age were within 1 unit of each other. The modal systolic blood pressure ranged from 92 mm., at the age of 5 years, to 122 mm., at the age of 16 years. The corresponding diastolic blood pressures ranged from 52 to 62 mm. The variation in the blood pressure readings increased with age and was more pronounced in girls from 10 to 13 years of age than in boys of the same ages.

The method used for summarizing information in regard to the relation between systolic and diastolic levels of blood pressure at different ages is new.

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INITIAL AEROBIC FLORA OF NEWBORN INFANTS

SELECTIVE TOLERANCE OF THE UPPER RESPIRATORY TRACT FOR BACTERIA

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In a preceding report [1] the initial flora of the upper respiratory tract of newborn, premature infants was described with reference to its source, character and time of appearance under various environmental conditions. A similar study of full term infants is presented here. The objects of this study were to compare the observations for the full term group with those for the premature group and particularly to determine the receptivity of full term infants to pathogens of the respiratory tract and to certain nonpathogens carried in the nose and throat of their nursing mothers.

MATERIALS AND METHODS

Like those in the previous study, the infants in the present investigation were born in the obstetric division of the New York Hospital. Each of the three nurseries in the hospital has a floor area of approximately 18 by 20 feet (5.5 by 6 meters) and a ceiling height of 12 feet (3.65 meters); each accommodates 32 to 36 infants when fully occupied. The air of the nurseries was neither conditioned nor subjected to ultraviolet irradiation. No visitors were admitted. The study was carried on from November to May.

All persons who were in contact with the infants except the mothers wore face masks of the conventional four layer gauze type or of the parchment paper, "throw-away" type. The first contact of an infant with the mother for breast feeding occurred about twelve hours after birth, and thereafter contacts for this purpose took place five times in each twenty-four hours. Specimens for culture were obtained, generally within twenty-four hours after delivery, from the nose and throat of the mother and of the infant in the manner described in our previous article.[1] The nasal specimens included material from the nasopharynx, as fine cotton swabs on flexible copper wire were passed back to that region. Repeated cultures were made for 70 infants, an average of 3.4 being made during their eight to nine day stay in the hospital. Occasional repeated cultures were made for mothers. No specimens for cultures were taken from physicians, nurses or other persons in contact with the infants.

The inoculated swabs were placed in a culture tube containing 1 cc. of "hormone" blood broth, and the surface of the culture plates was seeded as promptly as possible. If delay in planting was unavoidable, specimens were kept in the refrigerator. The media employed were "hormone" blood (rabbit) agar (pH 7.4) and 5 per cent sucrose agar prepared according to the formula of Sherman and his associates [2] except that sodium azide was omitted. The inoculated blood broth tubes were incubated for twenty-four hours at 35 C., and additional platings were made as seemed desirable. All cultures were incubated aerobically at 35 C.

TABLE 1.—*Bacterial Content of Cultures from the Nose, the Nasopharynx and the Throat (Combined) for 105 Newborn, Full Term Infants During the First Day of Life*

Age in hours	0 to 6		7 to 12		13 to 18		19 to
Total no. of infants	29		33		26		17
	No.	%	No.	%	No.	%	No.
Sterile							
Nose and nasopharynx	26	89.6	21	63.3	8	30.8	0
Throat	26	89.6	14	43.8	1	4.0	0
Staphylococcus albus	3	10.3	10	33.3	24	92.3	13
Diphtheroids	1	3.4	1	3.0	2	7.7	3
Streptococcus							
Alpha or gamma	2	6.0	10	33.3	16	65.1	13
Producing mucoid colonies	0	0.0	1	3.0	1	4.0	3
Staphylococcus aureus	0	0.0	1	3.0	4	15.4	5
Hemophilus haemolyticus	0	0.0	0	0.0	0	0.0	1
Escherichia coli	0	0.0	1	3.0	0	0.0	0

RESULTS OF CULTURES MADE DURING THE FIRST TWENTY-FOUR HOURS OF LIFE

In table 1 are given the results of culture of material from the noses and throats of 105 infants from whom specimens were taken at the specified periods during the first twenty-four hours of life. Each age group comprised seven infants. Of the 29 cultures made during the first six hours of the infant's life, 26, or 89.6 per cent, yielded no growth from either the nose or the throat; of those made within four hours

This work was aided by a grant from the Louis Livingston Seaman Fund of the New York Academy of Medicine.

From the New York Hospital and the Departments of Pediatrics and of Public Health and Preventive Medicine, Cornell University Medical College.

The investigation was conducted under the auspices of Dr. Samuel Z. Levine and through the permission of Dr. H. J. Stander, who gave access to the nurseries and wards of the obstetric division of the New York Hospital. Mrs. May H. Salinger gave volunteer technical assistance.

1. Torrey, J. C., and Reese, M. K.: Initial Aerobic Flora of Newborn Premature Infants, Am. J. Dis. Child. **67**:89 (Feb.) 1944.

2. Sherman, J. M.; Niven, C. F., Jr., and Smiley, K. L.: Streptococcus Salivarius and Other Non-Hemolytic Streptococci of the Human Throat, J. Bact. **45**:249 (March) 1943.

infant's birth, 21, or 95 per cent, were rile. These observations substantiate the clusions of our previous article, that under d obstetric conditions the initial flora of the per respiratory tract is acquired largely from environment after birth and not primarily m the vaginal region of the mother, as was erted by Salomon [3] and also by Witkowski.[4] The abrupt drop in the percentage of sterile tures, particularly cultures of material from throat, in the thirteen to eighteen hours r birth was probably due mainly to the first tact with the mother for breast feeding, approximately twelve hours after birth. None of cultures from the 19 to 24 hour age group wed sterility of the nose or the throat.

The more prolonged period of sterility of the per respiratory tract of the previously rerted premature infants may be ascribed in rt to artificial feeding and in part to the spel precautions, including ultraviolet irradian, observed in their care.

Only 1 infant had acquired Escherichia coli the nose or the throat during the first day able 1), and a total of 2 infants (2 per cent) d done so by the second or the third day. is observation may be contrasted with Witwski's statement that she detected the presce of this organism within the same period in per cent of 50 infants.[4] As the principal urce of Esch. coli in the oral cavity within a w days after birth is presumably the perineal d vaginal region of the mother, their percente incidence may perhaps be taken as an indiitor of the quality of prenatal asepsis practiced an obstetric service.

White staphylococci, largely Staphylococcus idermidis, alpha or gamma streptococci and, uch less frequently, diphtheroids were the robic bacteria first grown from the throats of wborn infants (table 1). In this observation e are in agreement with Kneeland [5]; we canot, however, confirm his statement that indifrent streptococci are more prominent than reen-producing types. From our study of preature infants we concluded that nonhemolytic pha and gamma streptococci occurring in the roats of newborn infants were derived prinpally from adults in contact with the infants nd were transmitted mainly through the medium of saliva droplets but that only certain fermentative types were readily implanted. Through the use of a differential 5 per cent sucrose agar medium we have found that this tolerance does not apply to the predominant type in the mouths of adults, Streptococcus salivarius. This species typically forms large mucoid colonies on this medium, and this characteristic alone, according to Sherman and his associates,[2] is a relatively safe criterion for its identification. As is shown in table 1, only a small percentage of the infants had acquired this type during the first day, and, as will be shown later, when acquired it was soon lost.

Staphylococcus aureus was implanted later in the first day than the albus type and in a much smaller percentage of infants. The nasopharynx and the nasal passages of the newborn are, however, highly tolerant to Staph. aureus, and when acquired the organism tends to overgrow other forms and persist there indefinitely. No pathogen other than Staph. aureus was recovered from any infant during the first day.

TABLE 2.—*Occurrence of Nonhemolytic Streptococci and Hemolytic Staphylococci (Aureus) in the Nose, Nasopharynx and Throat*

Age, Days	No. of Infants	Nose-Nasopharynx Positive		Throat Positive	
		No.	%	No.	%
Streptococcus (Alpha or Gamma)					
1	105	19	18.0	37	35.2
2-3	79	33	41.8	72	91.1
4-8	63	18	28.6	63	100.0
Staph. Aureus (Haemolyticus)					
1	105	7	6.6	5	4.8
2	61	31	50.0	23	37.7
3	79	41	62.0	31	39.2
4-8	63	56	88.8	35	55.5

In table 2 is given the percentage occurrence of nonhemolytic streptococci and Staph. aureus in the noses and throats of the same 105 infants during the first week of life. These figures may be compared with those in table 3 of our previous article reporting corresponding findings for premature infants. The main difference between the incidence of streptococci in premature and that in full term infants is that there is a sharp decrease in percentage incidence in the noses of full term infants after four to eight days of life, whereas in premature infants an increase occurs regardless of ultraviolet irradiation. On the other hand, the percentage incidence of Staph. aureus in the noses of full term infants 2 days old was much higher than that for infants of corresponding age in the wards for premature infants, being 50 per cent for the former as against 12 and 15 per cent for the

3. Salomon, R.: Die Entstehung der Genitalflora: . Die Entstehung der Mundkeime, Ztschr. f. Geburtsh. Gynäk. **85**:306 (Oct.) 1923.

4. Witkowski, R.: Aerobe Mundhöhlenflora bei utter und Kind, Zentralbl. f. Bakt. (Abt. 1) **133**:334 Feb. 18) 1935.

5. Kneeland, Y., Jr.: Studies on the Common Cold: I. The Upper Respiratory Flora of Infants, J. Exper. ed. **51**:617 (April) 1930.

latter in wards with ultraviolet irradiation and without irradiation, respectively. It is probable that the higher Staph. aureus content of the air of the nurseries for full term infants and the breast feeding of these infants both contributed to earlier acquisition of this organism.

It is evident from table 2 that the nose was more favorable for the growth of Staph. aureus and the throat for streptococci, as also is the case normally with adults. This observation confirms that of Kneeland. No essential difference was observed in the character of the basal flora of the upper respiratory tract of newborn infants whether premature or full term.

Table 3 gives the results of culture. In this table the degree of maternal infection and transmission to infants in contact with them is reported for five pathogens recovered from the nose or the throat of 1 or more mothers. These figures are based on direct platings of the specimens and not on cultures enriched by incubation or mouse inoculation.

The pneumococcus, with the strain identified by typing, offered the best opportunity for detection of a maternal donor. Seventeen (22.8 per cent) of the mothers and only 3 (4.3 per cent) of the infants harbored the pneumococcus. Moreover, in no instance was a mother identified

TABLE 3.—*Bacteriologic Findings for the Nose, the Nasopharynx and the Throat of Newborn Infants and Their Nursing Mothers*

	(Mothers (70)				Infants (70)		
	Positive			Degree of Growth on Culture Plates *	Positive		
Pathogens	No.	%	Types		No.	%	Types
Pneumococcus	17	22.8	3, 6 (3), 8, 9, 15 (2), 16, 18, 19 (2), 22 (2), 24, 28, 31	9 +++ 6 ++ 2 +	3	4.3	9, 29 (2)
Hemolytic streptococcus	8	11.4	Beta	+	1	1.4	Beta
Bacillus mucosus capsulatus	5	7.1	Friedländer	+	0	0.0	
Hemophilus influenzae	7	10.0	Not B	++	0	0.0	
Meningococcus	1	1.4	.....	++	0	0.0	
Other organisms							
Staph. aureus	15	21.3	Coagulase- and mannitol-positive	+ to ++	63	90.0	Coagulase- and mannitol-positive
Hemophilus haemolyticus (Bacillus X)	14	20.3	.....	++	3	4.3	
N. catarrhalis	4	5.7	.....	+	1	1.4	
Streptococcus forming mucoid colonies on 5% sucrose agar	70	100.0	Streptococcus salivarius	30 +++ 14 ++ 22 +	17	24.3	Str. salivarius

* +++, colonies very numerous; ++, colonies numerous; +, colonies few.

RELATION OF FLORA OF UPPER RESPIRATORY TRACT OF MOTHERS TO THAT OF THEIR BREAST-FED NEWBORN INFANTS, PARTICULARLY WITH REFERENCE TO PATHOGENIC BACTERIA

The principal objective of this part of the study was to determine to what extent pathogens of the upper respiratory tract carried by mothers are transmitted to their nurslings during the first week of life. Seventy mothers and 70 infants were studied. As has been stated, the mothers did not wear face masks while nursing their infants. This close and unrestricted contact occurred as high as five times in twenty-four hours. Specimens for culture were taken from the mothers on the first or second day after delivery, and in a few instances others were taken a few days later; specimens for culture were taken from the infants soon after birth and at intervals up to seven to nine days thereafter, when they were routinely discharged from the hospital.

as the source of the infant's strain. Two infants acquired the type 29 pneumococcus, which was not found in any of the mothers, and another type 9, which was not present in his mother's flora. It was evident, accordingly, that these infants received the organism from a source other than the mother. No instance of pneumococcic pneumonia occurred in this group of 70 infants during the period of observation.

Although the number of infants with the pneumococcus was too few for a definite conclusion, the rapid disappearance of this organism from the nasopharynx suggested that the pneumococcus does not readily adapt itself to that region in the newborn. One infant from whom a positive culture was obtained seventeen hours after his birth had negative cultures on the third and fifth days. In another the organisms were fairly numerous on the second day and very numerous on the fourth but had practically disappeared by the eighth day. As is indicated in table 2, moderate to heavy growths of pneumococci were obtained from the swab-

from the nasopharynxes of 15 of the 17 ers with positive cultures. Their respec- infants were thus brought into intimate and stricted contact with a definite source of tion, and yet in no instance was there trans- ion from that source. Maternal carriers pes 1 or 2 were not found, and there was 1 carrier of type 3.

ur observations support Kneeland's[5] con- on that the pneumococcus is not readily anted in the nose or throat during irst two weeks of life, but differ from those Gundel and Schwartz,[6] who asserted that had isolated a pneumococcus from the oral y or the nose of 30 of 52 infants (59 per) during the first twelve days of life. Our rvations are at variance also with those of kowski,[4] who reported isolation of pneu- occi from swabbings from the oral cavity of 23 0 infants (46 per cent) up to five days after . Type 3 Pneumococcus was found pre- inant in both of these studies: Gundel and wartz[6] observed it in 36 per cent of the nts with positive cultures and Witkowski in per cent. Type 1 was not isolated from any nt in either investigation and type 2 from 1 infant (Witkowski). There is no men- of pneumococcic pneumonia developing in of this group of 53 infants with positive ures for the organism; however, the period bservation was apparently brief.

ight (11.4 per cent) of the mothers in the sent study had beta hemolytic streptococci, in each instance the organisms were isolated n cultures of material from the throat alone. y 1 infant (1.4 per cent) harbored the anisms, and he acquired them from a source er than his mother. Witkowski found that per cent of the mothers had hemolytic strepto- ci and that 14 per cent of the infants also them up to five days after birth. She ressed the belief that these organisms are uired in part from the vagina at birth and t they may have lost their hemolytic property he vagina and then regained it in the infant's uth. This transformation seems improbable us. Gundel and Schwartz reported the iso- ion of "hemolytic" streptococci from the nose oral cavity of 13 per cent of 52 infants during first three days and of 63 per cent up to lve days after birth. The latter percentage extremely high for the beta type, and it is t stated that the term "hemolytic" was re- stricted to that type. These workers stated the belief that the origin of the organisms is in the maternal mouth rather than in the vagina or the breast.

The Friedländer bacillus was found in small numbers in the nose or the throat of 7.1 per cent of the mothers but in no infant of our series. Kneeland also failed to find this organism in the nose or the throat of 30 infants during the first two weeks of life. This observation may be compared with its presence in 9 per cent of mothers and in 8 per cent of infants up to 12 days of age reported by Gundel and Schwartz and in 34 per cent of mothers and in 16 per cent of infants up to 5 days of age reported by Witkowski. In the present study the term Friedländer bacillus is restricted to the organisms in cultures exhibiting the differential characteristics of Klebsiella pneumoniae.

Ten per cent of the mothers of our group were carriers of Hemophilus influenzae, but none was a carrier of type B. No infant acquired this organism during the first eight days of life. Kneeland also reported negative findings for the first two weeks. On the other hand, Gundel and Schwartz reported the isolation of H. influenzae from 43 per cent of mothers and 18 per cent of infants after the third day of life. These authors did not state that the term was restricted to nonhemolytic strains of hemoglobinophilic influenza-like organisms, as was done in our study.

One maternal carrier of the meningococcus was encountered in our series, but the organism was not transmitted to the infant in contact with her.

Coagulase-positive Staph. aureus is generally regarded as a potential pathogen. This organism was acquired by 63 (90 per cent) of the newborn infants within the first week and grew actively, in most instances in the nose. In fact, the nasal passages of newborn infants are generally much more favorable for its growth than those of adults. The primary implantation of Staph. aureus occurred, with few exceptions, in the throat, but the organism spread quickly to the nose and generally grew actively. After a week this organism tended to disappear from the throat. This preference for the nasal passages apparently persists throughout life. Among 74 physicians, nurses and ward attendants, all in contact with infant patients, 33 (44.6 per cent) were carriers of coagulase-positive Staph. aureus; 97 per cent of these were nasal carriers and only 9 per cent throat carriers or nasal and

6. Gundel, M. W., and Schwartz, F. K. T.: Studien r die Bacterienflora der oberen Atmungswege Neuge- ener, Ztschr. f. Hyg. u. Infektionskr. **113**:411, 1932.

throat carriers. Hallman [7] reported that of 49 adults (over 19 years old) who were hospital patients without other staphylococcic infection, 44.9 per cent carried coagulase-positive Staph. aureus in the anterior nares—a figure in surprisingly close agreement with our percentage. Fifteen (21 per cent) of the present group of 70 mothers were carriers of coagulase-positive Staph. aureus. Obviously, then, the majority of infants received implantations from sources other than the upper respiratory tracts of their respective mothers. These sources probably included the mother's breast, the fingers and the mouth droplets of physicians and nurses and, particularly, the air of the nurseries.

A nonpathogenic representative of the hemoglobinophilic group, fairly frequent in the throat of normal adults, is Hemophilus haemolyticus, sometimes designated as Bacillus X. It was found in the throat of 14 mothers (20 per cent) and also in the nose of 1 mother. Only 3 (4.3 per cent) of the 70 newborn infants acquired this bacillus—1 possibly from his mother and 2 definitely from other sources. In each instance it was recovered on the first or second day and had disappeared by the third or fourth day. The quick disappearance of this hemoglobinophilic bacillus and the failure to find H. influenzae with known exposure suggest a lack of adaptation of the hemoglobinophilic group to the upper respiratory tract of the newborn.

Another bacterial type frequently found in the throat of the adult but rare in that of the newborn is the gram-negative diplococcus (Neisseria group), a representative of which is Neisseria catarrhalis. This organism was recovered from only 1 infant (1.4 per cent); it appeared in the nasopharynx on the first day and disappeared by the fourth day. Four (5.7 per cent) of the 70 mothers had this organism, but the mother of the infant who had it was not one of them.

A most striking illustration of lack of adaptation of certain bacteria prevalent in adult mouths to the corresponding region in newborn infants is provided by the behavior of a nonhemolytic streptococcus producing mucoid colonies on 5 per cent sucrose agar. As has been stated, Sherman and his associates [2] regarded production of such colonies as a relatively safe presumptive test for Str. salivarius. This streptococcus was invariably found in throat cultures of the mothers and often was the predominant strepto type, whereas it was recovered from the of only 4 per cent of the mothers. All newborn infants in contact with their mo were thus exposed to this streptococcus, often to a greater degree than to any mouth organism; and yet over 75 per ce the infants failed to show this organism in tures of material from the nose or the th In the 17 infants (24.3 per cent) yielding tive cultures of this mucoid colony–produ streptococcus from the nose as well as the th conditions for its propagation were appare so unfavorable as to result in its almost im able disappearance within a week. It appe then, that Str. salivarius does not success adjust itself to the upper respiratory trac the newborn, for, as Bloomfield [8] pointed many years ago, the persistence of an orga on a normal mucous membrane is dependen a biologic relationship to the mucous sur

COMMENT

The few published studies of the flora of upper respiratory tract of newborn infants h been in general agreement as to the nonpat genic bacteria commonly found but not as the occurrence and source of certain pathog The observations of Bloomfield [8] and Kneela agree with those made in this and in the p ceding study in that cultures of material fr the throat and nose during the first week or t of life are reported to be rarely positive for s pathogens as the pneumococcus, the beta hemo tic streptococcus, H. influenzae and Friedlä er's bacillus. On the other hand, Gundel Schwartz,[6] and later Witkowski,[4] reported almost equal incidence in the oral cavities the infants and of the mothers in contact w them. This discrepancy may be due to diff ences in the taking and subsequent treatm of the specimens for culture, and hence in int pretation. The latter two investigators swab all parts of the oral cavity, seeded a dextr broth tube from the swab and then plated fr the broth culture after six to ten hours, after twenty-four hours of incubation. M were also inoculated from the broth cultu These methods, although perhaps favorable the detection of even the casual pathogen the secretions of the mouth, do not serve differentiate between mere presence in the

7. Hallman, F. A.: Pathogenic Staphylococci in the Anterior Nares: Their Incidence and Differentiation, Proc. Soc. Exper. Biol. & Med. **36**:789 (June) 1937.

8. Bloomfield, A. L.: Adaptation of Bacteria Growth on Human Mucous Membranes, with Spe Reference to the Throat Flora of Infants, Bull. Jo Hopkins Hosp. **33**:61 (Feb.) 1922.

y and actual implantation on the mucous brane of the nasopharynx and throat. In words, they have little quantitative value. was our purpose to investigate particularly atter point, and we believe our observations y the conclusion that the newborn infant y acquires such pathogens as the pneumo- us, the beta hemolytic streptococcus, H. in- zae and the Friedländer bacillus to the t of implantation, even when he is in close ct with a mother who is a carrier. It would , then, that the hazard to infants of this group from carriers of these pathogens of respiratory tract is less than is generally osed. Evidence in support of this conclu- is provided by the fact that no one of the fants in contact with their respective pneu- ccus-carrier mothers acquired the organism that source and, also, by the observation 3 other infants showing some degree of antation of pneumococci in the nasopharynx ly after birth spontaneously rid themselves ese organisms within a few days.

he assertion of Kneeland that the mucous branes of the nasal passages and throat of ts during the first few weeks exhibit rela- intolerance for pathogens of the respiratory has found confirmation in our studies of full term and premature infants. Kneeland er demonstrated that this unreceptive period t of long duration. Of a group of 28 infants 8 months old and free from colds, he found ffer's bacillus in 7 per cent and the pneu- ccus in 14 per cent of nasal cultures and ffer's bacillus in 53 per cent and hemolytic tococcus in 11 per cent of cultures of ma- l from the throat.

t least two explanations may be offered for restricted character of the flora of the upper iratory tract of the newborn. It may be ibed to a selective passive immunity con- d by immune globulin of maternal origin. , of course, well established that the relative dom from a number of the communicable ases of childhood during the first six months ue to an inherited specific immunity, but ther a similar factor is accountable for the nomenon under discussion is questionable. only do the pathogens listed, including the y specific types of the pneumococcus, fail hrive on the mucous membranes of the nose throat of the newborn, but the same is true such nonpathogenic organisms as Str. saliva- and the gram-negative diplococci, which are ommon in the adult mouth. One would have ostulate that the maternal immune globulin encompasses specific antibodies for a diversity of organisms. If the failure of Str. salivarius to thrive is due to inherited antibodies, why are not other green-producing streptococci affected?

A more plausible explanation would seem to be that the failure of these organisms to gain a foothold is due not so much to inherited antibodies in the secretions of the nose and throat as to the fact that the immature state of these mucous surfaces does not provide the physical and nutritive conditions necessary for their growth and metabolism; in other words, there is a failure in biologic adaptation.

It has been demonstrated that the routine wearing of conventional face masks by persons engaged in the care of newborn infants is not an important preventive measure against transfer of respiratory organisms to the infants. Their value is further minimized by the fact that the types ordinarily employed cannot be depended on to retain mouth droplets carrying bacteria, as was demonstrated in our previous article,[1] and particularly by the fact that newborn infants as a group are relatively refractory to pathogens causing acute infections of the respiratory tract. Although the nursing mothers did not wear face masks, not a single infant in contact with them was infected with pneumococci from that source, although 17 of the mothers were known to be carriers; the 3 infants yielding positive nasopharyngeal cultures acquired the pneumococci from other sources, presumably from persons wearing face masks or, less probably, indirectly, through dust-laden air. Our bacteriologic findings and those of Kneeland seem to indicate that this age group is less in need of special measures to protect them against acute infections of the respiratory tract than are infants several months older.

SUMMARY AND CONCLUSIONS

Cultures were made of material from the throats and the noses of 105 full term infants during the first twenty-four hours after birth. With the mediums and methods employed no bacterial growth was obtained from swabbings of those regions taken within four hours after birth in 95 per cent of the group so studied. This result confirms the conclusion of our previous study that normally the initial flora of the nose and throat is acquired mainly from the environment after birth and not from the parturient canal. Cultures of material from infants 13 to 18 hours old indicated continued sterility of the nose in 31 per cent and of the throat in 4 per cent, but by the end of the first day the

cultures of all infants examined yielded growth from both regions.

White staphylococci, alpha or gamma streptococci and, less frequently, diphtheroids were the first organisms to invade the oral cavity. Coagulase-positive Staph. aureus was recovered from 9.5 per cent of the infants during the first day, from 50 per cent after the second day and from 88.8 per cent between the fourth and the eighth day. The nose of the newborn provides a much more favorable soil for the growth of this organism than does that region in the adult.

Our observations indicate that the upper respiratory tract, during the first two weeks of life, rarely becomes infected with such pathogens as the pneumococcus, the beta hemolytic streptococcus, H. influenzae, and the Friedländer bacillus through contact with nursing mothers who are carriers of these organisms. Although occasionally the pneumococcus was cultured from the nasopharynx within a days of birth, it soon disappeared from the s tions. The mucous membrane of this regi the newborn infant is unreceptive not onl these pathogens but to certain other bac types, such as Str. salivarius, the gram-n tive diplococci and the hemoglobinophilic haemolyticus, which thrive there later in If acquired, these organisms are also soon e inated. As this phenomenon was exhibited respect both to pathogenic and to certain pathogenic bacteria, it is believed to be du failure in biologic adaptation rather than to action of immune globulin of maternal or

The routine use of the conventional type face masks by persons in contact with the in is of little value in preventing the acquisition the newborn infant of organisms of the resp tory tract, pathogenic or otherwise.

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TREATMENT OF THE RAT BITE FEVERS WITH PENICILLIN

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DETROIT

The subject of the rat-bite fevers has been ably viewed recently by Brown and Nunemaker.[1] ese writers and others (Albritten and associ- s[2] and Kato[3] have stressed the fact that there two rat-bite fevers: one caused by Spirillum nus and the other by Streptobacillus monili- mis. S. minus has been isolated from the od of patients with rat-bite fever (sodoku) by culation of guinea pigs and mice but has never n satisfactorily cultivated in vitro. Strepto- illus moniliformis, on the other hand, has been tured from the blood of patients with the other e of rat-bite fever by use of special technics. own and Nunemaker showed that the symp- ns and course of the two diseases may be remely similar, although other authors (Rosen d Denzer,[4] Larson,[5] and Albritten and associ- s) have asserted that characteristic differential tures exist. Since methods for isolation of S. niliformis have been publicized, the majority the reported cases of rat-bite fever in which the se has been determined have been found to be e to this organism rather than to S. minus.

The treatment of infections due to S. minus s been fairly well outlined, and arsenicals, such neoarsphenamine and mapharsen, have been ed, with good results. The treatment of infec- ns due to S. moniliformis thus far has been satisfactory. The sulfonamide compounds ve no effect on these organisms, and treatment th the arsenicals has given dubious results. old salts in the form of gold sodium thiomalate have been shown effective in the treatment of experimental infections in mice (Heilman[6]) but have not been shown to lead to dramatic responses in the treatment of infections in human beings.

In the literature distributed Dec. 1, 1944 by the War Production Board, Office of Civilian Distribution, infections due to S. minus were not mentioned, and penicillin was stated to be of questionable value in the treatment of infections due to S. moniliformis. Heilman and Herrell,[7] however, found that penicillin was effective in the treatment of mice infected experimentally with each of these organisms. Fifty mice were infected with S. minus, and one half of these animals were treated with penicillin. None of the treated mice became sick, nor did their blood continue to show spirilla. The authors referred to also mentioned the work of Lourie and Collier,[8] who obtained a similar result with penicillin in the treatment of infections due to S. minus in mice. Heilman and Herrell infected 86 mice with S. moniliformis. Of the 43 untreated mice, 42 died. All of the treated mice survived.

Robins[9] reported the case of a 70 year old man with infection due to S. moniliformis following a rat-bite, who improved after administration of penicillin. Altemeier[10] described 3 patients with rat-bite fever due to S. moniliformis; 2 patients recovered promptly while 1 had a relapse, with reappearance of the organism in cultures of the blood "after an inadequate amount of penicillin was given." Kane[11] reported the prompt cure

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by penicillin of a boy 15 years old with infection due to S. moniliformis following a rat-bite. So far as I know no one has reported the use of penicillin in infections due to S. minus in human beings.

My experience at the Children's Hospital of Michigan during the first eleven months of 1944 has confirmed the conclusions of recent writers regarding the causation of rat-bite fever. Twenty-five children have been seen with rat-bites as the chief complaint or with sequelae of rat-bites. One child died of pneumonia after extensive rat-bites but without clinical signs characteristic of rat-bite fever. Five others had rat-bite fever. S. moniliformis was isolated from the blood stream of 4 of these children and S. minus from that of 1 child. One of the children with infection due to S. moniliformis died of diarrhea and jaundice after having had one dose of mapharsen. The remaining patients were treated with penicillin and had prompt and dramatic recovery.

It is the purpose of this report to present the results of treatment with penicillin in these 4 patients and to point out the ease with which S. moniliformis has been isolated from patients who had rat-bite fever due to this organism.

INFECTION DUE TO STREPTOBACILLUS MONILIFORMIS

BACTERIOLOGY

Methods of Recovering the Organism.—The diagnosis of infection due to S. moniliformis following rat-bite rests on culture of the organism from blood, joint fluid, if the patient has arthritis, or pus, if an abscess develops. The usual procedure is culture of the blood.

The organism is pathogenic for mice; so it may also be recovered from mice inoculated intraperitoneally with the patient's blood. Since mice are also susceptible to infection with S. minus when inoculated in the same manner, it is undoubtedly wise to perform mouse inoculations, as well as cultures of the blood in any case of rat-bite fever. The mice used must be proved to be free of spontaneous infection with S. minus.[1]

Criteria for Identifying the Organism.—The criteria used in identifying an organism as S. moniliformis are clearly described by Brown and Nunemaker. Briefly, the organism is characterized by its unusual growth requirements, its morphologic features, its pathogenicity for mice and its production of components called L_1 forms, resembling organisms occurring in pleuropneumonia. Both the streptobacillus and its L_1 component require a high protein content in the medium (20 to 50 per cent of ascitic fluid or plasma). In broth the organism grows in small colonies, termed "cotton balls" or "fluff balls," resting on the surface of the sedimented red cells. On smear these "fluff balls" are seen to be composed of gram-negative masses of tangled filaments and tiny rods, often with fusiform swellings, or "knobs," many times the diameter of the bacillary forms. The characteristic pleomorphism is best demonstrated with Giemsa's or Wayson's[1] stain. Living organisms inoculated into mice give rise to septicemia, usually fatal, with involvement of the heart and joints. The pleuropneumonia-like micro-organism, or L_1, component streptobacillus cultures is barely visible under the o nary microscope but can be made to grow in charac istic tiny colonies and can be studied by special meth (Dienes[12] and Brown and Nunemaker).

Methods of Culture. — The procedure outlined Brown and Nunemaker and other writers for isola of S. moniliformis is admittedly formidable, and th authors, Rosen and Denzer and others have stres the fact that this organism was not isolated ex with their special technics. It is my experience the streptobacillus is fairly easy to isolate. U the procedure to be described, I have on seven occasions cultured the blood of infants with rat- fever due to S. moniliformis. Eight cultures sho the presence of the organism; 2 cultures were cont nated, and 7 cultures of blood taken after penicillin administered to the patient showed no growth. C plete studies were made on the organism from my patient, with demonstration of the L_1 colonies. Th after I used as criteria for identifying the organism growth requirements, the appearance of the colonie broth and on agar and the pleomorphism and stain characteristics on smear.

My first strain of S. moniliformis was grown for tously from the blood of a baby who had been bitten b rat. The blood for culture was not taken with any atte to achieve the precise growth requirements of the st tobacillus. As precisely as I can recall at the time writing, about 8 cc. of blood—more than was or narily used—was introduced into a blood culture fl containing about 35 cc. of broth—somewhat less t was ordinarily used. The flask was incubated i large candle jar which was routinely used for bl cultures. This combination satisfied the growth quirements of S. moniliformis as to high concen tion of protein, and a heavy growth of the organi was obtained. With this technic I have been able culture the organisms, when present, in all my sub quent cases.

At present the house staff has learned to culture blo from children bitten by rats in the broth routinely e ployed, but to use at least 8 cc. of blood to 50 cc. broth. The broth is made as follows:

Bacto tryptose phosphate broth.....	29.5 Gm.
Bacto proteose no. 3 agar.....	1.0 Gm.
Paraaminobenzoic acid	5 mg.
Water	1,000 cc.

Of course, once it is known that the blood cult is that of a patient with a rat-bite, it is hand cautiously in the laboratory and is observed with c under strong cross lighting with a portable spotli after a minimum of agitation. Any cotton balls su gestive of S. moniliformis are removed with a flam capillary pipet, without moving the flask.

Brown and Nunemaker advised the use of dextro starch agar enriched with ascitic fluid in subcultur these organisms. I have used this medium and ha observed good results with certain samples of asci fluid. Of course, a transparent medium must be u for identification and study of the L_1 forms. Howe in every instance I have been able to obtain a be colony growth of S. monoliformis by using a chocol agar medium. The largest colonies I have seen ha been on chocolate agar, dextrose-starch agar (Dif being used as the base. However, the chocolate a

12. Dienes, L.: L Organisms of Klieneberger Streptobacillus Moniliformis, J. Infect. Dis. **65**:24 (J Aug.) 1939.

ium which I use routinely for isolation of gonococci for cultures of the spinal fluid has proved satisory. This medium is made as follows:

Bacto proteose no. 3 agar.....	45 Gm.
Paraaminobenzoic acid	50 mg.
Water	1,000 cc.

To the sterilized and melted base 5 per cent of fresh citrated human blood is added and the mixture heated to 80 C. (176 F.), when the medium is chocolate brown; thereupon it is cooled and poured into plates or tubes.

inoculated plates are always incubated at 37 C. in ndle jar.

is interesting to note that on one occasion the unt of blood sent to the laboratory was insufficient culture in the routine manner, and the blood had ially clotted. The liquid portion was used to inocua mouse, and the clot was smeared over the ace of a chocolate agar plate. Two days later no wth could be observed where the clot had been ared. However, the clot was moved to a new posi, and the plate was reincubated. The next day a e number of colonies of streptobacilli were observed he site where the clot had rested. I have not had opportunity to try this technic since this occasion, it would seem to warrant further trial.

n summary, my present procedure in culturing the od for this organism is as follows:

1. At least 8 cc. of the patient's blood (usually citrated) to not more than 50 cc. of the broth routinely employed is used.
2. The flask containing the mixture is incubated at 37 C. in a candle jar.
3. The flask is removed from the incubator daily, care being taken to avoid agitating it, and is examined under strong cross light.
4. Any cotton ball colonies are aspirated with a flamed capillary pipet operated by a rubber bulb.
5. The colony is transferred to a chocolate agar plate.
6. A portion of the inoculum is removed to a slide for Gram stain and the remaining portion streaked over the chocolate agar.
7. The subcultures are incubated in a candle jar.
8. Plain agar and blood agar plates are inoculated from the subculture, and smears for Giemsa stain are made.
9. Identification of S. moniliformis is made on those organisms which have a typical fluff ball appearance in broth, which are gram-negative and have a typical pleomorphic appearance on smear, which fail to grow on plain agar and which grow scantily, if at all, on fresh blood agar.

CASE REPORTS

Case 1.—C. D., a 7 week old Negro baby, had been ten by a rat on the left hand and the lip four days ore entry to the hospital. Immediately after the rate the finger swelled, and the next day a visiting rse noted a red streak extending up the arm. On s day the baby began to have several soft green ols a day and was feverish and lethargic. The before entry he had noticeable loss of appetite.

On examination the baby appeared to be well deoped and nourished but irritable. There were healing rs on the middle finger of the left hand and on the , which represented the sites of the rat-bites. These ions were not inflamed or indurated. There was derate cervical adenopathy; but no epitrochlear glands uld be felt, and there was no lymphangitis.

The patient's temperature on his admission was 101 F., his weight 12 pounds 1 ounce (5,897 Gm.), the hemoglobin content of his blood 9.6 Gm. per hundred cubic centimeters and his white cell count 8,650 per cubic millimeter. The Mazzini test gave negative results.[13] A culture of the blood was taken on the patient's admission. The baby was given sulfadiazine in an effort to prevent pyogenic infection at the site of the local lesions. On the day after his admission both ankles seemed edematous and painful. On the third day the wrists were also edematous and painful. At this time the culture of the blood showed S. moniliformis. Another specimen of the blood was taken for culture, and the child was given penicillin, 5,000 units administered intramuscularly every two hours. As can be seen from chart 1, the child's temperature fell rather promptly and remained under 100 F. after the second day of treatment. The painful swellings of the ankles and

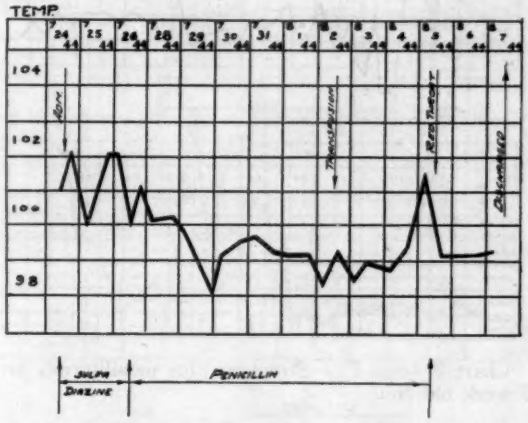


Chart 1 (case 1).—Streptobacillus moniliformis in a 7 week old child.

wrists were at their greatest intensity on the day after treatment was started; after this time they receded, and all symptoms of arthritis had disappeared after the fifth day. The hemoglobin level fell to 7.6 Gm. per hundred cubic centimeters of blood, and for this reason the baby received a transfusion of 100 cc. of red blood cells. There was a transitory rise of temperature to 101.5 F. on the ninth day, accompanied by redness of the throat. Treatment was stopped after ten days, and the baby remained symptom free. He was seen at the clinic two months later; there had been no recurrence of the symptoms.

Case 2.—O. H., a 5 week old, premature boy, had come from a lying-in hospital about a week prior to his entry into the Children's Hospital of Michigan. On the

13. Mazzini, L. Y.: A Reliable, Sensitive, Simple and Rapid Slide Flocculation Test in Syphilis, Am. J. Clin. Path. 9:163 (March) 1939.

patient's admission to the hospital it was thought that he had an infection of the upper part of the respiratory tract, with slight otitis media and bronchitis, and he was given sulfadiazine, in the usual dosage. The day after his entry the baby had considerable inspiratory stridor. On the third day after his entry this condition had progressed to the point of great respiratory distress, and the baby was placed in an oxygen tent. On the fourth day the clinical condition was considerably worse. Breathing was difficult even in oxygen, and there was considerable swelling of the penis and scrotum.

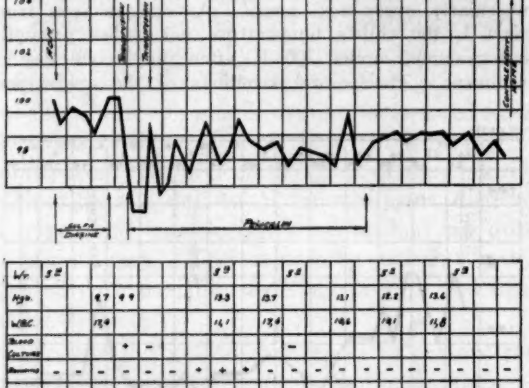


Chart 2 (case 2).—Streptobacillus moniliformis in a 5 week old child.

Blood was noticed on the diaper, and the urine contained large numbers of red cells and reacted positively to a test for albumin. A roentgenogram of the chest showed minimal perihilar congestion. It was still felt that the baby had tracheobronchitis; because of his failure to respond to sulfadiazine and because of the red cells in the urine administration of the drug was discontinued, and he was given 5,000 units of penicillin intramuscularly every two hours. At this time blood was taken for culture. On the following day it was noted that the child had a healing scar on the little finger of the left hand. It was then learned from the mother that the child had been bitten by a rat on this finger shortly after coming home from the lying-in hospital, i. e., about one week prior to entry to this hospital. Because of this history, the culture of the blood was observed with special care, and the typical cotton balls of S. moniliformis were seen. During the next four days the obstruction to breathing continued, but the patient's condition improved slightly, and, as can be seen from chart 2, his temperature began to climb toward normal.

On the third day of treatment a small, fluctuant swelling over the xiphoid process was noted for the first time. This was aspirated with a syringe, and 2 cc. of thick, pink pus was removed. Smears of this material treated with the Giemsa and with the Gram stain revealed no organisms. The material was placed in tryptose phosphate broth enriched with ascitic fluid and on chocolate agar. No growth was ever observed in the broth, but after four days the chocolate agar culture showed numerous tiny colonies of S. moniliformis. The sternal abscess subsided after the aspiration, and no trace of it was noted four days later. On the day the sternal abscess was observed there was also painful edema over the dorsum of each foot; this disorder lasted about three days. The respiratory difficulty grad subsided and after the fifth day of treatment was troublesome. Penicillin was administered for ten and the subsequent course of the illness was uneve

The baby was sent to a convalescent home at end of his stay in the hospital, where he remained six weeks, without any signs of recurrence of hi fection.

Case 3.—L. G., a 6 month old Negro boy, was b by a rat on the left foot four days before his entry the hospital. Two days before entry he was give single preventive inoculation against rabies at ano hospital. On the day before his admission he feverish and irritable, a condition which was attrib to the treatment for rabies. On the day of entry had a rash on the back of both hands.

Examination showed a fairly well developed nourished baby, lying in opisthotonos. The rash on backs of the hands was a fine macular eruption, w faded on pressure. On the left foot there were a fifteen wounds, which were healing. The hemoglo content of the blood was 7.8 Gm. per hundred c centimeters, and examination showed many sickle c The white cell count was 25,000 per cubic millime A lumbar puncture was performed because of the rigi of the neck. Examination of the spinal fluid showed cells and a normal sugar content, and culture yielde organisms. Culture of the blood at this time yiel

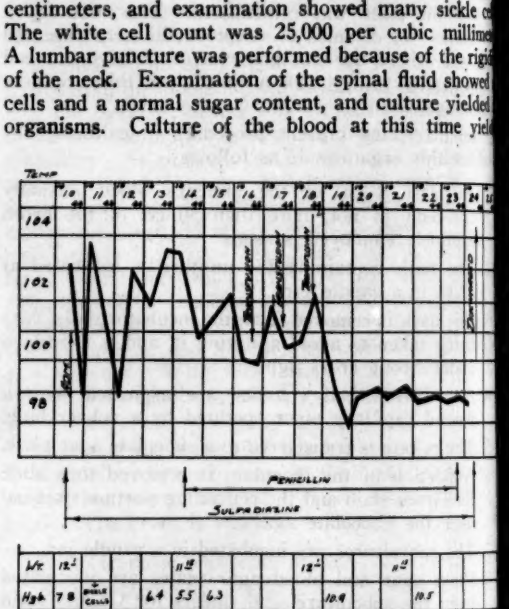


Chart 3 (case 3).—Streptobacillus moniliformis i 6 month old child.

Staphylococcus albus. The child was given sulfadiazi to prevent pyogenic infection at the site of the rat bit On the day after the patient's entry to the hospital blo was drawn for another culture, and on the third day specimen was drawn for injection into a mouse. the patient's fifth day in the hospital the characteris cotton balls of S. moniliformis were observed grow in the second blood culture. Administration of penicill was started, 5,000 units being given intramuscular every three hours. At this point the hemoglobin le

allen to 5.5 Gm. per hundred cubic centimeters, he white blood cell count was 9,000 per cubic eter. The child was still extremely irritable and ad opisthotonos. The fall of his temperature to l can be followed on chart 3. In two days the was much more comfortable than previously, and sh had disappeared. Administration of penicillin discontinued after nine days, and the child was rged home as well.

ouse into which 0.5 cc. of blood had been injected eritoneally died on the eleventh day, and S. monili- s was grown from the heart's blood by streaking surface of a chocolate agar plate.

COMMENT

me writers have stated that a rash is a con- finding in cases of infection due to S. liformis. It will be noted that 2 of my nts had no rash. In 1 baby (case 1) it was d for assiduously but was not seen at any The other baby (case 2) was a dark Negro, he was wrapped up inside an oxygen tent, ny rash present may well have been missed. previous case of fever due to S. moniliformis h I observed a definite rash was present only a period of eight hours, although the febrile se lasted more than a month; so it is apparent the rash may be transient and must be looked arefully.

my experience definite and progressive ia has been a constant symptom in infants infections due to S. moniliformis, although my patients (case 3) also had sickle cell ia.

ase 2 is of special interest because of the res- tory distress. I attributed this to a lesion of larynx, probably similar to the lesion in an t reported by Brown and Nunemaker. I also seen in an older child with rat-bite r severe respiratory distress, which required use of oxygen and a steam room for a week.

will be noted that, although none of the d taken after administration of penicillin was ted yielded growth on culture, the sternal ess in case 2 progressed to the point of fluctu- n three days after administration of the drug been started, and viable organisms were re- ered from the pus. However, this lesion ed spontaneously, with no further drainage. s apparent that penicillin quickly controls the eremia, although infections of the tissue dis- ear more slowly.

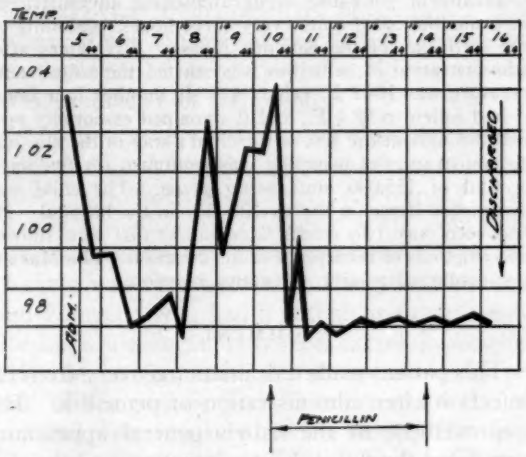
t can readily be seen from the charts that the peratures of the patients with infections due to moniliformis reached a normal value after two our days of treatment with penicillin and that remained at that level. I have no idea what minimum dose should be, but it is evident that course of infection in these 3 patients was nitely shorter than that ordinarily expected.

INFECTION DUE TO SPIRILLUM MINUS

CASE REPORT

CASE 4.—J. T., a 3 month old Negro boy, was bitten on the face by a rat while in bed with his mother thirteen days before his entry into the hospital. He received two injections of rabies vaccine at another hospital in the next two days. The wounds on the face healed in two or three days. For about two days before entry the baby was feverish, irritable and restless, and there were moderate redness and swelling at the sites of the bites.

Examination on the patient's admission showed a well developed and nourished infant who had a temperature of 103.5 F. but did not appear acutely ill. Red, indurated areas were present in the right parietal region



WT.	9 12					9 12			9 12			
Hgb.	9.0					9 3						8.9
W.B.C.	13,3					10,3						10,9
BLOOD CULTURE	–			–		–						
HOUSE INOCULAT.						+ +						
ARTHRITIS	–	–	–	–	–	–	–	–	–	–	–	–
RASH	–	–	–	–	+	+	±	–	–	–	–	–
LOCAL LESIONS	+	±	–	–	±	+	–	–	–	–	–	–

Chart 4 (case 4).—Spirillum minus in a 3 month old child.

and on the right side of the nasal bridge; but there was no drainage from these sites, nor was there local glandular swelling. The skin was clear. The hemoglobin content of the blood was 9 Gm. per hundred cubic centimeters, the white cell count was 13,000 per cubic millimeter and the Mazzini test gave a negative reaction.

On the child's admission it was thought that he had rat-bite fever. Blood was taken for culture and treatment was withheld. The following day the temperature had fallen to normal, and the local lesions were fading. On the fourth day the temperature again rose to 103 F., and another specimen of blood was taken for culture. On the fifth day, it was discovered that the child had a coarse macular rash over the upper part of the chest anteriorly, and he was becoming irritable. By the sixth day the local lesions were again reddened, the rash

was more prominent and the baby was apathetic. It was felt that treatment could no longer be withheld, but before it was begun blood was drawn for another culture and for mouse inoculation. One-half cubic centimeter of the patient's blood was injected into each of 2 white mice, which had been shown by Giemsa-stained smears to have no spirilla in their blood. The mice remained well, and a smear of the blood from the tail of 1 of them on the sixth day showed no spirilla. However, on the fifteenth day blood smears of both mice were positive for organisms morphologically identical with S. minus. On the seventeenth day 1 of the mice was killed, and spirilla were demonstrated in smears of blood and, in considerably larger numbers, in smears of the peritoneal washings. The three cultures of the patient's blood and a culture of the heart's blood of the mouse which was killed were negative for S. moniliformis.

Treatment consisted in intramuscular administration of penicillin, 5,000 units every three hours, beginning on the sixth day of the patient's illness. Five hours after administration of penicillin was started the baby's temperature was 104.2 F. (chart 4). In another four hours it had fallen to 98.4 F., and it remained essentially normal throughout the rest of the child's stay in the hospital. Administration of penicillin was continued for five days, a total of 155,000 units being given. The child was discharged home on the twelfth day in the hospital. He was seen once two weeks later and at that time showed no symptoms of recurrence of his infection. The Mazzini test continued to give a negative reaction.

COMMENT

This patient made a dramatic recovery from his infection after administration of penicillin. The improvement in the baby's general appearance paralleled the fall in his temperature and the disappearance of the rash. While no subsequent mouse inoculations were made to determine the length of time necessary to rid the blood stream of spirilla, the sudden reversal of the downhill course of the illness leads me to feel that penicillin was responsible for the improvement.

It will be observed that of the 4 patients described only the child with infection due minus had redness and swelling of the lesion. Inflammation at the site of the should suggest the possibility of infection d S. minus, and it indicates the necessity of inoculation, in addition to cultures of the

SUMMARY AND CONCLUSIONS

It has been possible to isolate and cul Streptobacillus moniliformis easily, using the mediums and equipment which are rout employed in the laboratories of most child hospitals.

Three patients with infection due to S. m formis following rat-bites showed rapid impr ment after administration of penicillin.

One patient with infection due to S. m following rat-bite showed rapid improve after administration of penicillin.

A dose of 5,000 units of penicillin given i muscularly every two to three hours for a to ten days seemed adequate to control both t of infection in these babies, who weighed fr to 12 pounds (2,268 to 5,443 Gm.).[14]

14. Since submitting this paper for publication I had opportunity to observe an additional infant months old) with S. moniliformis septicemia due rat-bite. The organism was recovered on eac two occasions by the method described. Pen (5,000 units every three hours administered intra cularly) was given at a time when the disease m have been undergoing a temporary remission. fever, rash and irritability disappeared on the s day of treatment. The administration of penicillin continued for nine days, and up to the time of wr there has been no recurrence of the disease.

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CELIAC SYNDROME

II. FECAL EXCRETION IN CONGENITAL PANCREATIC DEFICIENCY AT VARIOUS AGES AND WITH VARIOUS DIETS, WITH DISCUSSION OF THE OPTIMAL DIET

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NEW YORK

he therapeutic problems presented by con-
al pancreatic deficiency form two groups,
relating to nutrition and those presented
he characteristic infections of the respiratory
. It is possible that the susceptibility to
tion is a sequel to the difficulty in digestion.
present study was begun in the hope that a
ry regimen might be worked out which
d result in adequate nutrition and growth
in improved resistance to pulmonary
tion.

or nearly a hundred years it has been known
when pancreatic secretion is excluded from
ntestine digestion is impaired and that pan-
ic ferments are required for normal diges-
of three of the main constituents of food,
ein, starch and fat. Moreover, it has been
d possible to maintain adult pancreatec-
zed dogs in good health by selection of diet,
tion of vitamins and of raw pancreas to the
and use of insulin.[1]

he dietary therapy for patients with pan-
ic deficiency has usually consisted in reduc-
the amount of dietary fat, without other
rations of the diet; this treatment is based
he clinical observation that an increase in fat
oorly tolerated, whereas other constituents
od do not alter the appearance or number of
stools. With recent awareness of the loss
t-soluble vitamins in steatorrhea, there has
loped a tendency to increase the intake of
mins A and D by patients with this disease.
effectiveness of preparations of pancreas in
g digestion has been disputed.[2] Before the
nt recognition that congenital pancreatic defi-
cy is a fairly frequent disease, there were few
s of pancreatic deficiency in human beings
which were suitable subjects of study. Now that congenital pancreatic fibrosis is being recognized in vivo, physicians are offered an opportunity of understanding this condition better and of improving their methods of therapy. The dietary limitations of infancy and the nutritional requirements of the period of rapid growth add to the difficulty of the problem.

The literature pertaining to digestion in pancreatectomized or duct-ligated animals is extensive and has been summarized elsewhere.[3] Two previous studies on patients with congenital pancreatic deficiency have been found. The first of these was reported on by Fanconi, Uehlinger and Knauer,[4] who had a patient with pancreatic fibrosis whose mean daily fecal excretion weighed 117 Gm., a figure far above normal[5]; 52 per cent of the protein and 50 per cent of the fat ingested were recovered in the feces. The diagnosis was later confirmed by postmortem examination. The second report was by Shohl, May and Schwachman,[6] who made a more complete study, of a series of 9 patients, with special reference to the nitrogen balance. These workers pointed out the large daily excretion of feces and of fecal nitrogen and demonstrated that with a normally adequate intake of protein the infant with pancreatic deficiency remains in negative nitrogen balance; if the nitrogen is fed in the form of hydrolyzed casein, it is more efficiently used. They concluded that the level of fecal fat is moderately elevated. The addition of a preparation of pancreatin which gave a high

his work was supported by the Commonwealth
d.

rom the Departments of Pediatrics and Pathology,
mbia University College of Physicians and Sur-
s, and the Babies Hospital.

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assay for trypsin and a low assay for lipase had the not surprising result of reducing the fecal nitrogen but not the fecal fat. On a fat-free ration of casein hydrolysate the excretion of feces and of fecal nitrogen was within normal limits. These observations have served to emphasize the inefficiency of protein digestion in pancreatic deficiency, a feature which has usually been inadequately considered in the treatment of the disease.

EXPERIMENTAL INVESTIGATION

The present experiments form three groups. The first is a series of determinations of total fecal excretion and of fecal excretion of fat by patients of various ages with pancreatic fibrosis while they were receiving a normal diet. Control figures have been previously reported.[5] The second group of experiments was undertaken with the object of observing the effect on the amount of fecal fat and of feces of alterations in the intake of fat and of addition of pancreatin. The third experiment consists of a more detailed study of the fecal excretion of fat, nitrogen, carbohydrate and ash by 2 patients who were observed while they were receiving a variety of diets of known composition.

METHODS

The manner of collection of feces and the Sperry method of analysis of fat have been previously described.[5]

The determinations of nitrogen were made on aliquots of feces taken from the original well mixed two or three day collection, which had been dried and ground—a method which results in loss of ammonia. A standard micro-Kjeldahl procedure was used. The resulting figures were multplied by the factor 6.25 to obtain the figures for protein which are recorded in the present paper. The ash was also determined on a dried ground aliquot of feces.

The starch was determined by a modification of the procedure described by Beazell and associates.[7] Five grams of fresh feces was placed in each of four tared 40 cc. centrifuge tubes equipped with stirring rods. The tubes were then filled with 95 per cent alcohol and the contents stirred vigorously and allowed to stand overnight. The alcohol was then decanted and the tubes filled with fresh alcohol. The washing was performed in this way four times or more, until the supernatant alcohol was colorless. The contents were then dried over a water bath. One hundred milligrams of soluble starch was added to each of two tubes. All were hydrolyzed with 20 cc. of two times normal hydrochloric acid on a water bath for two hours, a small funnel being inserted in each tube to reduce evaporation. The reducible sugar was then determined by the Somogyi method.[8] The mean sugar content for each pair of tubes was calculated. The difference be the sugar found in the tubes with added corn and in those without gave the amount of sugar ob from 100 mg. of corn starch. With the use o factor the amount of starch in the tubes without starch could be calculated. Some error is intro because of the presence of dextrose originating in lose and protein. However, control data, to be lished later, show that normal infants rarely e more than 1 Gm. of starch daily as determined b method.

OBSERVATIONS

EXPERIMENT 1.—*Fecal fat of patients of ous ages with pancreatic fibrosis receivi normal diet.*

In the preliminary experiments the per cent of fat on a basis of the dried weight was determined no record was kept of the length of the period of lection, and neither the proportion of ingested fat was recovered nor the daily excretion of feces an could be estimated. A somewhat more satisfactory was then adopted: Data were obtained for three collection periods while the patients were fed no diets. The diets used and the control figures have reported.[5] Although less accurate than a com balance study, this method has the advantage of less time consuming and hence of permitting a gr number of observations. The intake of fat was measured, but the minimum intake could be calcu from the amount of formula of known composition was consumed during the collection period. The am of fat in the solid food consumed is not known, bu young infants it is usually small in comparison wit amount in a whole milk formula, while for older in the solid food of a normal diet supplies one third to half of the fat ingested. The first group of observa is composed of a series of 20 analyses for fat of obtained from 17 patients of various ages while were receiving a diet normal for their age, inclu whole pasteurized or evaporated milk; 13 of the analyses were made on three day collections of fec

The gross appearance of the stools was o normal during the first few months of although the odor was usually abnormal. later infancy, after solid foods had been ad the stools were usually large but were for and were of normal color and consistency. odor was penetrating and distinctive. mother described it as "like stale marigol Loose or watery stools were only occasion seen, and no foamy stools were encounte When the patient was receiving a normal all ance of fat, microscopic examination of the f showed a +++ or ++++ amount of This finding was consistent, and absence microscopic fat from the feces of a pa receiving a normal amount of fat is adeq evidence for ruling out the diagnosis of p creatic deficiency.

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spection of the data presented in table 1 ws several points of interest.

For 3 infants under 6 months of age with creatic fibrosis the daily excretion of feces within the normal range. If these observa- s are confirmed by study of a larger series atients, the fact that the stools of infants with disease are often considered normal during first months of life will be explained. In all f the determinations made, however, the portion of fat in the feces was grossly eased as compared with controls. One is pted to conclude that the other dietary constituents are utilized with a fair degree of efficy in the early months, but the data are too to permit so bold a conclusion. After the of 6 months, and therefore after the addition olid foods to the diet, the weight of feces eted daily is well above the limit of normal, a wide range of variation in different nts. It varies from two to ten times the n of normal.

The water content was less than the mean the controls in 16 of 20 patients. The charristic stool was not loose or watery.

The proportion of fat in the dried feces was ter for children under the age of 6 months than for older children; it was well in excess of normal for all patients except 1, who was doing badly and not eating well. For children over 6 months of age the absolute amount of fecal fat and of total feces was greater. The per cent of fat in the feces was smaller, but it is evident that this was not a result of better utilization of fat but, rather, was due to poorer utilization of other food constituents.

4. The proportion of fat present as neutral fat was above the upper limits of normal in only 3 instances. It has previously been shown [5] that the neutral fat may be split while the sample of stool is standing, even under refrigeration, presumably by action of the fecal flora. It is evident that the presence of a normal proportion of fecal fat as neutral fat cannot be used as a point against the diagnosis of pancreatic deficiency.

TABLE 1.—*Fecal Fat Excretion of Infants of Various Ages with Pancreatic Insufficiency Fed a Normal Diet*

Patient	Case No.	Age	Condition	Fat in Formula *	Stool				
					Gm./Day Wet Weight	Water, per Cent	Fat, per Cent Dried Weight	Fat, Gm./Day	Neutral Fat, per Cent of Fat
n. (1).....	16	6 wk.	Fair	17.5	23.5	56.8	41.4	4.2	27.2
.....	18	10 wk.	Fair	18.3	17.5	66.0	55.8	3.31	31.1
(1).....	4	3 mo.	Poor	....	....	72.8	61.0	....	41.0
(2).....	4	4 mo.	Fair	....	....	79.4	60.0	....	25.4
.....	17	4½ mo.	Poor	13.7	13.2	60.2	45.7	2.4	22.4
e. (2).....	16	5½ mo.	Fair	....	....	78.0	52.3	....	24.3
trols.....	..	2-6 mo.	Good	....	17.2	74.7	22.1	0.80	21.9
. D.....	..	.....	.....	....	± 8.8	± 3.9	±10.5	±0.31	±11.4
.....	5	7 mo.	Fair	22.1	....	71.0	34.7	8.73	22.2
E.....	7	7 mo.	Fair	27.2	....	73.2	62.1	....	19.1
.....	14	8 mo.	Poor	....	41.9	82.3	41.2	4.8	25.0
.....	24	8 mo.	Good	29.0	67.3	67.9	41.4	9.0	33.0
.....	30	8 mo.	Poor	....	78.3	73.9	36.7	7.6	18.3
.....	21	9 mo.	Good	16.05	53.4	75.0	32.8	5.41	13.4
.....	19	9 mo.	Good	30.6	143.0	69.8	39.5	16.9	15.6
.....	..	10 mo.	Poor	....	....	69.7	38.3	....	46.0
trols.....	..	6-12 mo.	Good	....	25.7	75.4	17.6	1.04	26.9
. D.....	..	.....	.....	....	±10.5	± 3.5	± 4.9	±0.41	±12.0
.....	8	14 mo.	Poor	....	.....	71.7	20.4	....	22.4
(1).....	11	16 mo.	Good	....	.....	85.3	46.0	....	39.6
.....	25	24 mo.	Fair	....	197.7	82.2	54.2	19.2	34.2
trols.....	..	12-24 mo.	Good	....	34.6	77.5	13.7	0.95	43.2
. D.....	..	.....	.....	....	±14.7	± 4.0	± 5.6	± 0.33	±13.5
(2).....	11	2½ yr.	Good	(63.8)†	301.0	75.9	37.1	27.6	32.6
y.....	27	2¾ yr.	Fair	17	178.9	77.1	29.3	12.0	19.3
(3).....	4	5 yr.	Fair	..	166.3	75.4	31.8	13.1	23.5
.....	22	5 yr.	Good	..	68.1	73.5	48.3	8.71	9.3
.....	26	5 yr.	Good	..	120.3	66.7	37.0	14.8	10.3
.....	9	7 yr.	Good	..	234.0	68.0	47.0	36.8	5.2
trols.....	..	2-6 yr.	Good	..	25.7	74.2	14.5	1.01	38.2
. D.....	..	.....	.....	....	±15.5	± 7.2	± 2.7	± 0.51	± 8.0

*The fat in the solid food was not measured but may be estimated at 30 to 35 Gm. per day at the ages of 6 to 12 months, at 35 to 50 Gm. per day after the age of 1 year on the basis of the diets given.[5]
†The total fat of the diet is given.

EXPERIMENT 2.—*Effect on fecal fat of reduction of dietary fat and of oral administration of pancreatin.*

Reduction in intake of fat results in decreased excretion of fat, as may be expected. The data are too few for elaborate analysis (table 2).

The effect of oral administration of pancreatin on the amount of fecal fat was studied in 8 experiments on 7 patients. The preparation used

was selected because of its high lipase content. Different batches of the pancreatin showed some variation, but in all instances the assay showed a fair amount of lipase,[9] and a higher content than that of three other preparations tested. These observations therefore offer no contradiction to the conclusions of Shohl that a preparation of pancreatin having a low assay of lipase has little effect on excretion of fat. It is evident that the reduction in total weight of feces excreted per day is usually greater than can be accounted for by the variations in lipase content. The favorable results obtained in these experiments have encouraged the routine clinical use of this preparation.

EXPERIMENT 3.—*Effect of various diets on fecal excretion of carbohydrate, protein and fat.*

Balance Studies on Two Patients.—An estimate of the efficiency of digestion and of the efficacy of therapeutic diets can best be made by food balance studies. Such studies are difficult to carry out, not only because they are time consuming but because of scarcity of appropriate subjects. Most patients with congenital pancreatic deficiency come to the hospital only after they have begun to have a severe infection of the respiratory tract. Such a condition not only affects intake of food by sometimes producing anorexia or vomiting after a bout of coughing, but introduces a partially understood deleterious effect on the digestive functions themselves. A patient without a severe infection of the respiratory tract but with pancreatic deficiency cannot usually be hospitalized for the fairly prolonged period required. It has been possible to carry out balance studies on 2 such patients, both of whom were doing well; seven diets were tested on the first patient and three on the second.

These studies were planned with the prin object of discovering the optimal diet for pati with pancreatic deficiency—specifically, the of diet resulting in the greatest retention of calories and of protein. Clinical experience shown that these patients do better when are fed the diet for patients with the celiac drome than when they receive a ward These two types of diet differ in several respe The diet for patients with the celiac syndrom high in protein, and the milk protein is in form of protein milk or pot cheese; it is lo cereal starch and sucrose and high in fruits vegetables; the fat content is low. The used in the present experiment were designe give information as to which of these factors of importance. It seemed possible that a with a high iodine number, such as corn might be better utilized than butter; that st in some form might be tolerated and used patients with this disease, if not by those

TABLE 2.—*Comparison of Effects of Various Formulas on Fecal Fat*

Patient	Case No.	Age	Condition	Formula	Fat in Formula, Gm./Day	Stool			
						Gm./Day Wet Weight	Water, per Cent	Fat, per Cent Dried Weight	Fat Gm./D
J. A.	18	3½ mo.	Poor	Evaporated milk	18.3	17.5	66.0	55.8	3.2
		7 mo.	Fair	Protein milk	16.8	55.5	76.2	24.6	3.3
		8 mo.	Poor	Skim milk	3.7	49.0	71.6	25.6	3.4
W. O.	5	7 mo.	Fair	Evaporated milk	34.4	87.0	71.0	34.7	8.1
		7 mo.	Fair	Protein milk	....	....	75.4	21.4	...
F. d'E.	7	7 mo.	Fair	Evaporated milk	27.2	....	73.2	62.1	....
		10 mo.	Fair	Protein milk	37.6	130.0	73.9	35.7	12.1
M. G.	19	8 mo.	Fair	Evaporated milk	30.6	143.0	69.8	39.5	14.9
		8 mo.	Fair	Skim milk	4.5	91.2	81.3	5.1	1.3

Numerous sources of error harry the inv tigator who attempts to study food balance. T most obvious of these is the difficulty of assur constant intake of food by patients too yo for intelligent cooperation. A second diffic is that of securing complete collections of sto in a ward where the patient is cared for by m different persons in the course of several da

celiac disease; that raw milk might be substitu for protein milk, and that sucrose might b useful form of carbohydrate, since it does require pancreatic digestion. The figures dietary intake are based on the weight of food as served; the figures for protein, car hydrate and fat in the foods are taken from tables of Chatfield and Adams.[10] It was feasible to weigh the food before cooking or analyze aliquots, although both of these p cedures would have increased the accuracy the results.

9. This preparation of pancreatin was obtained from Eimer and Amend, New York. The trypsin assays about 400 viscosimetric units; the amylase, 7,000 to 18,000 viscosimetric units, the lipase, about 10 units (Willstätter method) per gram.

10. Chatfield, C., and Adams, G.: Proximate C position of American Food Materials, Circular United States Department of Agriculture, 1940.

specimen was known to have been lost in the ent experiments, and since the stools were and formed, the loss on the diaper was mal. A third source of error is the change mposition of the stools on standing until the pletion of the collection: The known changes splitting of fat and starch, loss of volatile genous and lipid products and increase in number of bacteria. These changes should of comparable degree in parallel studies ied out with the same procedures and should invalidate comparison of results for different rimental periods.

he difficulties in obtaining accurate figures excretion of carbohydrate are greater than e case for fat. The figure for "carbohydrate ifference" in tables 5 and 7 is arrived at by racting the figures for protein, fat and ash affected by unavoidable variations in the time and temperature of storage of the feces.

The figure for nitrogen in the stool is a fairly good measure of protein digestion. In addition to nitrogen from undigested food, it includes nitrogen from fecal bacteria and intestinal secretions and cells from the alimentary tract. Volatile nitrogenous products are lost, but the error so introduced is probably small under the conditions of the experiment. The nitrogen contained in fecal bacteria is presumably derived from food nitrogen and hence may be viewed as unutilized food nitrogen.

The origin of fecal lipids has been discussed elsewhere. The average daily fecal excretion of fat does not exceed 2 Gm. for normal infants.[5]

The unknown factors, in spite of their multiplicity, are presumed to be relatively constant for

TABLE 3.—*Effect of Administration of Pancreatin on Fecal Fat*

ient	Case No.	Age	Condition	Formula	Fat in Formula, Gm./Day	Pancreatin, Gm./Day	Stool			
							Gm./Day Wet Weight	Water, per Cent	Fat, per Cent Dried Weight	Fat, Gm./Day
. D.	4	3 mo.	Poor	Evaporated milk	19.2	0	....	72.8	61.0	...
		4 mo.	Poor	Evaporated milk	21.1	5	67.9	76.2	44.6	7.4
		4½ mo.	Fair	Evaporated milk	25.8	5	....	77.0	46.4	...
		5 mo.	Fair	Evaporated milk	28.8	0	....	79.4	60.0	...
A.	18	7 mo.	Fair	Skim milk	3.4	5	37.4	76.0	11.8	0.9
		8 mo.	Fair	Skim milk	3.6	5	26.3	50.5	19.6	2.1
		8 mo.	Fair	Skim milk	3.7	0	49.0	71.6	25.6	3.6
		10 mo.	Fair	Skim milk	3.6	5	32.9	68.9	11.7	1.2
. G.	19	8 mo.	Good	Skim milk	4.5	0	91.2	81.3	5.1	1.3
		8 mo.	Good	Skim milk	4.2	5	41.5	....	...	0.7
G.	21	9 mo.	Good	Skim milk and Protein milk	4.2	5	104.7	80.8	20.8	4.13
					4.2	0	148.1	76.1	14.4	4.4
d'E.	7	10 mo.	Fair	Protein milk	37.6	0	130.0	73.9	35.7	12.1
		10 mo.	Fair	Protein milk	39.0	4	126.3	73.2	16.1	5.5
J.	11	28½ mo.	Good	Whole cow's milk	Total 63.8	0	301.0	74.1	37.2	27.6
		29 mo.	Good	Whole cow's milk	Total 63.8	6	301.0	66.8	34.4	23.0
Gy.	27	30 mo.	Fair	Evaporated milk	17	0	178.9	77.1	27.3	12.0
		30 mo.	Fair	Evaporated milk	16	3	106.9	79.0	30.2	6.8

vered from the dried weight of the total l. It is undoubtedly too high; it actually resents starch plus other carbohydrate plus igested cellulose plus volatile nitrogenous and l material. On the other hand, the starch ually determined by analysis is less than the ch present in fresh stool, and the figure repres total starch excreted minus starch destroyed other carbohydrate which is soluble in 95 cent alcohol, plus dextrose derived from tein. The dextrose derived from protein ht introduce a considerable error in analysis stools of these patients. The "carbohydrate difference" is probably a better measure of retion of carbohydrate than direct determina- of starch, since the other constituents in- ded in the former figure are small and do not y greatly in the different experimental iods, while the loss of starch may be greatly the same patient when he is fed different diets if the same procedures are used. Comparison of the effects of different diets on the same patient should therefore be significant.

First Series of Studies (C. J., Case 11).

The first series of experimental diets were fed to C. J., a boy of 28 months, over a two month period. The diagnosis of pancreatic deficiency was based on the characteristic clinical picture and the absence of pancreatic enzymes from the duodenal juice on three determinations made at the ages of 15 months, 27 months and 4½ years. The patient had had a chronic cough since the age of 2 months; during the period of the present experiments he was afebrile, active and in good general condition except for his small stature (length, 87 cm.) and a dry, hacking cough.

The daily menus were identical throughout each experimental period (table 4). The given diet was fed for two days before collections of stools were begun and was continued during the two, or sometimes three, days of the collection period. The diets formed two groups. The first group, for periods I, II, IV and V, were

isocaloric, at a level of 130 calories per kilogram of body weight; the second group, for periods III, VI and VII, provided 150 calories per kilogram, since it had become evident that none of the diets of the previous group resulted in a gain in weight. At both caloric levels the patient eagerly ate all the food provided, and it was unnecessary to weigh refused food.

Diets I and II were planned for the purpose of comparing a relatively saturated fat—butter—with a fat containing a high proportion of unsaturated fatty acids—

TABLE 4.—*Summary of Diets Used in Balance Study on C. J.*

Period	I and II	III	IV and V	VI and VII
Experiment	Corn oil vs. butter	Celiac diet	Bread vs. potato	Ward diet, pancreatin
Calories per day	1,432	1,650	1,400	1,650
Carbohydrate, %	50	45	50	50
Proteins, %	20	25	20	15
Fat, %	30	30	30	35
Breakfast *				
Orange juice	..	..	..	150
Tomato juice	..	150	150	...
Egg	(1)	(2)	(1)	(1)
Banana	100	200	..	..
Oatmeal, dry	..	..	20	16
Bread or toast	..	..	IV 30	30
Sugar	..	..	..	10
Fat	5	..	IV35, V 10	5
Noon *				
Lean meat	50	60	50	50
Pot cheese	40	60	..	..
Fat	I 10, II 15	10	5	5
Peas, green	100	..	..	..
Carrots	..	40	50	100
Lettuce	30	..	..	..
Bread	..	..	IV 30	30
Potato	..	..	V 120	100
Banana	..	..	100	..
Peaches	100	100	..	..
Custard	..	..	..	135
Night *				
Lean meat	30	50	..	..
Pot cheese	..	60	50	30
Fat	15	8	10	5
Squash	..	50	50	..
String beans	75	..	..	..
Tomato juice	100	..	..	50
Bread	..	..	IV 30	30
Potato	..	..	V 120	..
Macaroni	..	..	..	50
Peaches	..	..	50	..
Apple sauce	..	..	..	100
Jello	100	100	..	..
Formula and between meals *				
Skim milk	875	730	700	..
Whole milk	..	..	..	600
Honey	60	85	30	..
Banana	60	30	50	..
Egg	(1)	(2)	IV (1), V (1½)	..
Dextrose	..	..	..	5
Orange juice	..	..	..	150
Note:				
Fat as butter fat (dry)	II 30	0	20.3	36
Fat as corn oil	I 30	18	..	..
Starch (cereal), dry	..	..	IV 57.7, V 13.6	64.8
Starch (potato), dry	..	..	V 57.7, V 35.2	14.9

* All portions are expressed in grams.

corn oil. The basic diet was a modified diet for patients with celiac disease in that it contained no cereal starches, potatoes or sucrose. The carbohydrate was provided in the form of bananas, other fruits, vegetables and honey. A skim milk formula was used. The butter or corn oil was given with the vegetables at a level of 30 Gm. a day; the total intake of fat was 50 Gm., the remainder being provided by eggs and meat. Diets IV and V were similar to the butter diet except that one third of the carbohydrate was supplied as starch. The starch in diet IV was fed as oatmeal and bread or toast and in diet V as oatmeal and potato. The purpose of using these diets was to compare the utilization of carbohydrate cereal starch (diet IV) with that of carbohydrate as potato (diet V) and as banana (diet II). procedure was suggested by the clinical impres later revised, that potato is less well tolerated by patients than cereal starch and also by the observ that cereal starch is better tolerated and satisfies h more effectively than banana. All four of these not only were isocaloric but contained the same ra protein, carbohydrate and fat.

The second group of diets, containing 150 calories kilogram of body weight, were designed to permit parison of the effects of a standard diet patients with celiac disease (III), a standard ward (VI) and the same ward diet with 6 Gm. of pancr added (VII). The diet for patients with celiac di contained a higher level of protein and less carbohyd and fat than the ward diet. The percentage of cal as fat was the same as in the first group of diets, 30 cent, and was made up to this level by the additio 18 Gm. of corn oil.

A preliminary survey of the figures obtai (table 5) shows that the total fecal excretion day was excessive for each of the diets. fecal excretion of a normal child of this age ceiving a ward diet, based on the mean o three day collection period, did not exceed Gm. a day wet weight, or 15 Gm. dry wei and the mean for the series [5] is less than this figure. The patient under consideration creted in excess of 300 Gm. wet weight, o Gm. dry weight, when fed each of the diets te This excess is not due to a disproportio loss of water. The loss of protein and of with all diets was between 40 and 60 per cen the intake. In six of the seven diets the pro retention was less than the 4 Gm. a day kilogram of body weight given as the requirem for infants.[11] The single exception is the high in calories for patients with celiac disea with this diet the protein intake was high.

A more detailed study of the observations the first group of diets shows that the star containing diets, IV and V, resulted in be retention of carbohydrate and hence of t calories than did diets I and II, in which ban and other fruits were used. There were al lesser total weight of stool and better reten of fat. These results may well be the result the smaller roughage content of these diets. figures obtained for the two starch-contain diets show a somewhat greater loss of car hydrate when bread was fed than when po was given; the difference is not great. Fur observation should be made before conclusi are drawn as to which source of starch is p erable. The chief difference between the ef of feeding corn oil and that of feeding butter

11. Holt, L. E., and Fales, H. L.: Food Req ments of Children: Protein Requirement, Am. J. Child. **22**:371-380 (Oct.) 1921.

to be the greater loss of protein when corn
s fed. The figure for excretion of protein
corn oil was fed is so different from all the
s that it should be viewed with skepticism
s confirmed by later experiments. The fig-
for retention of protein when diets II, IV
were fed were essentially the same, within
nge of experimental error. The level was
ly below that believed necessary to maintain
itive nitrogen balance, according to some
ates.

e second group of diets provides a basis for
arison of the results with the standard diet
atients with celiac disease and those fed a
ard ward diet. The former diet resulted
ger stools and a somewhat poorer retention

The effect of adding pancreatin to the ward diet is not striking. One gram of pancreatin in powder form was mixed with food at each meal and at each of the three between-meal feedings. There was mild improvement in the retention of carbohydrate and fat and no effect on the retention of protein. A small increase in the number of calories retained was the chief result.

Second Series of Studies (M. O., Case 13).

The subject of these experiments was a girl of 9 months. The diagnosis of pancreatic deficiency was based on the following evidence: (1) a family history of 3 siblings who gave clinical evidence of the disease and who died in infancy, with postmortem confirmation in 1 instance; (2) absence of pancreatic enzymes from duodenal juice obtained at the age of 6 months, and (3) the digestive inefficiency established in the present studies.

e 5.—*Summary of Balance Study on C. J.: Mean Daily Intake (Four Days) and Fecal Excretion (Three Days) of Protein, Carbohydrate, Fat and Ash for Each Experimental Period*

	I	II	III	IV	V	VI	VII
	28	28	28	28	28½	28¾	29
	11.0	11.0	11.3	11.2	11.5	11.0	11.5
	Basic, corn oil added	Basic, butter added	Celiac diet with banana	Basic, bread and cereal	Basic, potato and cereal	Ward, whole milk	Ward, whole milk, pancreatin, 6 Gm.
ries per day	1,432	1,432	1,650	1,402	1,415	1,650	1,650 (1,674)†
bohydrate, Gm.	170.6	170.6	185	174.7	176.2	206	206
arch, Gm.	0	0	0	57.7	59.4	83.9	83.9
tein, Gm.	73	73	104	72.7	72.3	65.2	65.2 (71.2)
Gm.	50.8	50.8	55	46.0	47.2	63.8	63.8
excretion							
s, Gm. per day, wet	366	333	378	330	307	301	301
s, Gm. per day, dry	101.1	81.3	101.3	78.5	68.3	74.1	66.8
bohydrate, by difference, Gm.	26.0	19.1	16.2	17.2	9.9	14.1	3.3
arch, direct, Gm.	....	....	6.7	7.6	6.2	5.3	3.2
tein, Gm.	49.4	31.6	51.9	35.2	31.4	28.6	34.7
Gm.	27.8	30.5	28.1	19.9	23.3	27.6	23.0
Gm.	?	?	5.06	6.1	3.7	3.8	5.8
ntage recovered							
bohydrate, Gm.	15.4*	11.2*	8.8	9.8	5.6	6.7	1.6
tein, Gm.	67.6	43.4	49.9	48.6	43.4	43.9	53.3 (48.7)
Gm.	54.8	60.0	51.1	43.3	49.3	43.3	36.0
ned calories	880*	954*	1,126	1,015	1,044	1,240	1,300 (1,324)
ories, per cent.	61.5*	66.6*	68.3	72.3	73.9	75.3	79.0
ories per Kg.	80.6*	86.7*	99.7	90.6	90.8	112.7	113.4
tein, Gm. per Kg.	2.3	3.8	4.6	3.1	3.6	3.4	2.7 (3.1)

These figures are high because the ash is not subtracted, and the retention of carbohydrate is calculated from the figure rbohydrate by difference.
The figures in parentheses under diet VII represent calculations in which the pancreatin is considered a source of calories rotein.

tal calories and also in a smaller proportion
d protein and retained fat. The difference
e proportional retention of protein is of
tful significance unless confirmed by other
riments, and the difference in retention of
ohydrate is probably within the limits of
rimental error. The absolute retention of
ein on the higher protein intake of the celiac
was significantly greater than the protein
tion when a ward diet was fed. The celiac
was the only one used in which the absolute
tion of protein allowed a safe margin for
th. The ward diet, with or without pancre-
resulted in the highest retention of calories,
rms of both proportion of fed calories re-
d and total calories retained per day. The
tion of protein was poor, however.

The diagnosis was suspected on the clinical grounds of failure to gain weight, of bronchitis at the age of 6 weeks, and of the family record. The patient was treated at once with diet, additional vitamins and sulfathiazole and the diagnosis confirmed later. She recovered from the initial bronchitis in a few weeks and has never since had bronchitis or pneumonia. She has gained slowly but steadily up to the age of 4 years and at the time of writing is normal in height and weight.

The experiments were carried out at home with the intelligent cooperation of the patient's mother, who prepared and weighed the food and weighed the refused portion. The collected feces were mailed to the laboratory and were received and analyzed the following morning. The purpose of the experiments was to discover the effect of substituting first butter and then starch for part of the carbohydrate given as sugar or banana in the basic diet. The basic diet was essentially the diet to which the patient was accustomed.

Because the previous patient, C. J., had required 150 calories per kilogram to maintain constant weight, the

diets for M. O. were planned at this caloric level. The amount actually consumed is estimated at 100 to 108 calories per kilogram of body weight for each of the experimental periods, and she continued to gain during all of them. The balance study also shows that digestion was more efficient in M. O. than in C. J.

Three diets were tested. The first, and basic, diet was a modified diet for patients with celiac disease. It was high in protein and low in fat; carbohydrate was provided in the form of banana, other fruits, vegetables and sucrose. It differed from the diet used for C. J. in that sucrose replaced honey and protein milk replaced skim milk. The second diet was similar except that butter was substituted for the sugar. The third diet was similar to the first except that one third of the carbohydrate was fed as wheat cereal. All diets contained the same number of calories and the same amount of protein.

fat may have acted as a mild cathartic. starch diet also increased the bulk of the but to a lesser degree; the starch itself app to have been used efficiently. With all three the retention of protein and of calories app to have been adequate; this conclusion is firmed by the patient's continued gain in we during the experiments.

COMMENT

A definitive statement as to the optimal for patients with pancreatic deficiency mus deferred until enough balance studies have made to eliminate variations due to indivi

TABLE 6.—*Composition of Diets Fed and of Food Eaten by M. O.*

	I Basic Celiac Diet		II Basic Diet with Added Butter		III Basic Diet with Added Starch	
	Offered	Eaten	Offered	Eaten	Offered	Eaten
Calories, total	1,400	974	1,400	1,050	1,400	98
Carbohydrate, %	45	53.3	35	38.4	45	5
Protein, %	25	21.4	25	23.2	25	2
Fat, %	30	25.7	40	37.3	30	2
Breakfast *						
Tomato juice	150	37	150	68.5	150	6
Banana (ripe)	100	98	100	97.5	...	...
Wheat cereal, dry	...	..	...	....	40	2
Sugar	...	..	...	....	5	
Egg	(2)	(1)	(2 and 1 white)	(2 and ¼ white)	(2)	(1/
Butter	...	..	4	4	..	..
Noon *						
Pot cheese	50	27.5	50	16.5	50	1
Minced liver	50	12.5	..	..	50	1
Minced beef	..	....	50	15.25	..	..
Strained carrots	50	47	50	43	50	4
Butter	..	..	4	3.75	..	..
Gelatin with banana	100	92	100	61.8	100	7
Night *						
Minced beef	50	10	50	11.5	50	1
Pot cheese	50	26	50	36	30	2
Strained string beans	30	24	30	25	30	2
Peaches	50	36.3	50	49	50	5
Sugar	23	14.3	..	..	6	
Wheat cereal (dry)	..	....	..	..	33	2
Zwieback	..	....	..	..	(3)	(1
Formula *						
Protein milk	76.5	70.9	76.5	68.9	76.5	7
Sugar	35.0	32.6	45.0	40.5	25.0	2

* All portions are expressed in grams.

Since the food offered was in excess of the patient's requirements, an opportunity was inadvertently offered for self selection of food. The patient consistently preferred a higher proportion of carbohydrate and a lower proportion of fat and protein than the planned diets contained. She also consumed a larger amount of the less efficiently used butter diet than she did of the other two, but she retained a smaller number of calories with this diet.

Comparison of the fecal excretion obtained when each of the three diets was given shows that the added fat of the butter diet was almost entirely excreted. The stools were greatly increased in bulk, and there was a somewhat greater loss of protein and carbohydrate as well as fat, a fact which suggests that the undigested

differences and experimental error. The pre studies represent a few preliminary experim designed to provide a tentative answer to practical question of what to feed the pati The conclusions drawn are based on few careful observations; they do not attempt a f solution of the many questions involved.

For these 2 patients, as in the longer se recorded in table 1, the feces were abnorm bulky when the patients were fed each of diets tested, and with all the diets there a great loss of protein and fat and a mode or small loss of carbohydrate. The results similar to those of comparable studies on do

The diets containing larger amounts of produced greater loss of protein and carbohyd as well as of fat. Since fat can be replaced

hydrate as a source of calories, dietary fat e reduced without reducing caloric intake. of the diets used was free of lipids, since meat and vegetables contain a variety of and since liberal doses of a concentrated ration containing vitamins A and D in oil provided. It was assumed that fat from foods would provide known and unknown tial lipids and fat-soluble substances, an mption which is confirmed by the clinical ience that patients do well for several years g the age of rapid growth on a diet with restrictions. M. O., for example, has been ving skim milk since the age of about 1 year, emainder of her diet being essentially similar

7.—Summary of Balance Study on M. O.: Mean Daily Intake (Four Days) and Fecal Excretion (Two Days) of Protein, Carbohydrate, Fat and Ash for Each Experimental Period

	I	II	III
	9 mo.	9 mo.	9 mo.
t	9.7 Kg.	9.7 Kg.	9.7 Kg.
	Basic, celiac	Basic, butter added	Basic, starch added
e per day			
ories	977	1,050	987
bohydrate, Gm.	130	103	124
Starch, Gm.	0	0	48.2
tein, Gm.	52	61	55
, Gm.	27.7	43.6	30.6
excretion			
s, Gm./day, wet	88.3	139.6	130.9
s, Gm./day, dry	23.9	46.2	34.0
bohydrate, by difference, Gm.	7.1	11.0	6.4
Starch, direct, Gm.	6.8	3.3	6.4
tein, Gm.	10.4	15.2	14.8
, Gm.	5.3	17.7	10.4
, Gm.	1.1	2.3	2.4
nt recovered			
bohydrate	5.5	10.7	5.2
tein	20.0	25.0	26.9
	19.3	40.5	33.9
ned			
ories	859	784	811
ories, per cent	87.9	74.7	82.3
ories/Kg.	88.6	81.0	84.0
tein, Gm./Kg.	4.3	4.7	4.2

e "basic diet with starch" the composition hich is given in table 6.

rotein is utilized by these patients no better fat. However, protein is essential for growth health, and there is no adequate substitute it. Moreover, a high protein diet is well ated and results in a higher absolute retenof protein. The only diet in the series given . J. which provided for adequate retention rotein was one in which 25 per cent of the ies was given as protein. In the case of O. all diets contained more than 21 per cent rotein, and all resulted in a retention of 4 or more of protein per day and in continued in weight.

he evidence as to the type of carbohydrate utilized appears contradictory in the experiments on the 2 patients. Both tolerated sucrose well, and this situation has been observed in most patients with the disease. The experiments on C. J. showed that he utilized cereal starches and potato better than he did banana. With the starch diets the figures for total feces and the fecal ash were lower than those with the diets for persons with celiac disease. M. O., on the other hand, retained more calories when fed the diet containing banana. Whether this difference is due to the difference in age, the presence or the absence of infection or individual variation cannot now be stated. Clinical experience has shown that older patients who are doing well tolerate cereal starch and show less hunger when fed this form of starch, but younger infants and infants who are not doing well tolerate it poorly. All infants seem to tolerate sucrose in amounts usual for their ages. The clinical test is often required before deciding whether starch should be included in the diet. Starch was added to the diet of M. O. at about the age of 14 months; it was well tolerated and aided in assuaging hunger.

The addition of pancreatin to the diet of C. J. had a mild effect on the retention of carbohydrate and fat but none on that of protein. It is possible that use of a preparation of pancreatin of higher trypsin assay might have been more effective in aiding protein digestion.

The loss of ash is great with all diets, but no correlation with the various other factors was perceived except for a rough parallelism with total fecal excretion.

The 2 patients studied showed a marked difference in efficiency of digestion. Whether this circumstance results from the fact that, whereas M. O. was free from infections of the respiratory tract, C. J. had chronic bronchitis or is due to difference in age or chance variation is not known. The difference between these 2 patients gives additional warning as to the importance of accumulating further information before drawing final conclusions.

Consideration of the observations presented leads to the suggestion that the optimal diet for patients with pancreatic deficiency is probably similar to that for patients with celiac disease with the exception of the form of the carbohydrate. Protein should provide about 25 per cent of the calories; the level of fat should be low; the carbohydrate content should be high and the starch should be given in part as cereal and potato if these foods are clinically tolerated. Sugar is well tolerated. The total caloric intake should be sufficiently high to satisfy hunger and allow gain in weight. Pancreatin should be given and also supplemental vitamins A and D, since

a diet low in fat may well be deficient in them. Vitamin B complex has also been given, with less clear indications.

SUMMARY AND CONCLUSIONS

The excretion of feces and of fecal fat by patients of various ages with congenital pancreatic deficiency while on a normal diet was studied. Total fecal excretion was within normal range for 3 patients under the age of 6 months but was excessive for older infants and children. The stools were usually formed and of normal appearance but had a distinctive and penetrating odor. The characteristic stool was not loose, watery or foamy. Fecal excretion of fat was excessive for all the patients.

The amount of fecal fat was decreased when the amount of dietary fat was reduced, the decrease being roughly proportional.

The results of administration of pancreatin were variable; the amounts of fecal fat and of total fecal excretion were usually reduced.

A series of 10 balance studies were made on 2 patients with congenital pancreatic deficiency for the purpose of determining the optimal diet for maximal retention of calories and of protein. The addition of fat increased the excretion of feces, protein, fat and ash. Corn oil, an unsaturated fat, and butter, a saturated one, were about equally well utilized. Adequate retention of protein was obtained only with diets deriving 21 per cent or more of their calories from tein. Carbohydrate was better utilized in form of cereal starch than in the form of ba No great difference was observed in the uti tion of bread and oatmeal as compared with of potato and oatmeal. Starch and sugar clinically well tolerated. In 1 patient feedin starch was followed by reduction in the bul feces; in the other, by an increase. A not difference was found in the efficiency of dige of the 2 patients. With a celiac diet, 1 pa required 150 calories per kilogram of body we per day to maintain his weight, while the o gained weight on 100 calories per kilog Whether this difference was the result chronic infection of the respiratory tract in former patient, of the difference in age o individual variation is not known.

On the basis of these observations it is gested that the optimal diet for patients congenital pancreatic deficiency is approxim as follows: The protein should provide 25 cent of the calories; the proportion of fat sh be small, but eggs and fat-soluble vitamins sh be included; the carbohydrate should be prov in part as sugar, and for older infants and dren part of it may be in the form of co starches and potato if these foods are clini tolerated.

Broadway and One Hundred and Sixty-Se Street.

Case Reports

COMPLETE HEART BLOCK IN AN INFANT ASSOCIATED WITH MULTIPLE CONGENITAL CARDIAC MALFORMATIONS

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re have been a number of previous reports tial or complete heart block associated with nital cardiac lesions in infants. Neverthehis condition is not common. Holt and tosh[1] made the brief statement that conl complete block is usually not associated erious cardiac abnormalities. Griffith and ell[2] said only that it may occur, especially ociation with defects of the interventricular n but also with other congenital malforns.

ngenital heart block is rare for two reasons. interventricular septal defects are usually or to the membranous septum, while the e of His runs posterior to it. Second, it ng been known, from the researches of keberg,[3] that the development of the intericular septum takes place after the develop of the bundle of His, and it is unlikely malformations of the septum will interfere the development of the bundle after the has appeared. The bundle is preserved en the posterior endocardial cushion of the canal and the annulus fibrosis, and it is these structures are destroyed or fused eart block results.

lson and Grant[4] in 1926 reported the first of heart block (partial) in which autopsy erformed. Carter and Howland,[5] Yater,[6] Lampard,[7] Fleming and Stevenson,[8] Leech,[9] vander Kloot,[10] Peel,[11] Leys[12] and others have added subsequent cases of partial or complete block. In the case described here the multiple lesions associated with the block are distinctive enough from those previously reported to warrant brief consideration.

REPORT OF A CASE

On Aug. 14, 1944, a 4 month old Panamanian girl was admitted to the pediatric ward of Gorgas Hospital, Ancon, Canal Zone. She had had a normal birth and an apparently normal development, but at the time of admission she had been coughing for two weeks and had occasional slight difficulty in breathing; during the night before hospitalization she had an acute episode of choking and cyanosis.

Physical Examination.—The child was a fairly well developed and well nourished infant weighing 7½ pounds (3,400 Gm.). Her temperature was 99.4 F. It was noted that cyanosis appeared when she cried or struggled. The anterior wall of the chest appeared abnormally prominent and somewhat emphysematous. The heart was greatly enlarged to percussion. The heart rate was 48 beats per minute, was regular in rhythm and did not change even after hard crying. There was a slow, booming, prolonged rumble (forty-eight times per minute) over almost the entire precordium and medially as far as the right sternal border. The rumble seemed to be systolic in position and was synchronous with the pulse. It was heard best over the second and third intercostal spaces to the right of the sternum and downward toward the epigastrium. Normal heart sounds could not be recognized. The rest of the physical examination revealed nothing remarkable.

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Griffith, J. P., and Mitchell, A.: Textbook of trics, ed. 3, Philadelphia, W. B. Saunders Com- 1941, p. 661.

Monckeberg, cited by Brown, J. W.: Congenital Diseases, London, John Bale, Sons & Curnow, 1939, p. 121.

Wilson, J. G., and Grant, R. T.: A Case of nital Malformation of the Heart in an Infant iated with Partial Heart Block, Heart **12**:295,

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9. Leech, C. B.: Congenital Complete Block: Case with Associated Patent Ductus Arteriosus, Am. J. Dis. Child. **39**:131 (Jan.) 1930.

10. Vander Kloot, A.: Congenital Bundle Branch Block as Result, Probably of Defect in the Interventricular Septum: Case, Am. Heart J. **19**:623, 1940.

11. Peel, A. A. F.: Congenital Block with Atrial and Ventricular Septal Defect, Brit. Heart J. **5**:11, 1943.

12. Leys, D.: Congenital Heart Block with Dextrocardia, Brit. Heart J. **5**:8, 1943.

Laboratory Data.—The hemoglobin content of the blood was 60 per cent (Tallqvist), and erythrocytes numbered 3,450,000 per cubic millimeter of blood. There were 8,400 leukocytes per cubic millimeter, of which 63 per cent were neutrophils, 1 per cent eosinophils and 36 per cent lymphocytes. During the course of the child's stay in the hospital the total leukocyte count was variedly elevated, at one time being 35,000 cells per cubic millimeter. The urine was consistently yellow, clear and acid in reaction. In every specimen there was albumin (1 or 2 plus). During the latter weeks there were hyaline casts and frequently a few pus cells. Examination of feces revealed nothing remarkable. A Wassermann test of the blood gave negative results.

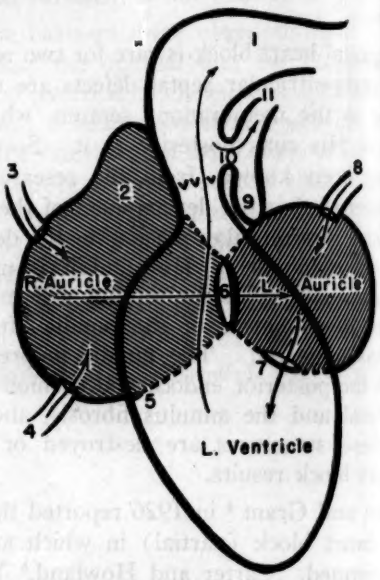
A roentgenogram of the chest made during the first part of the child's stay in the hospital revealed considerable enlargement of the heart, involving particularly the left ventricle. This configuration of the heart was considered not characteristic of any particular congenital cardiac lesion. An electrocardiogram taken at the same time as the roentgenogram showed complete auriculoventricular heart block, right axis deviation and high P waves in leads I and II, which suggested enlargement of the right auricle.

Course in the Hospital.—Because of the patient's slightly elevated temperature and the fact that neither tympanic membrane was visualized well, sulfathiazole therapy was instituted. In spite of this, acute purulent bilateral otitis media became evident a few days later and stubbornly persisted in the face of repeated myringotomies and several courses of sulfathiazole and sulfadiazine. It was this otitis media which was responsible for the leukocytosis and for an elevated temperature, which spiked as high as 105 F. at one time.

During the six weeks' course the cardiac status remained about the same. The heart rate of 48 beats per minute persisted whether the baby was quiet or struggling or crying. The character of the murmur likewise remained unchanged. At times the child appeared cyanotic and at times moribund. The dyspnea and cyanosis increased gradually, even though an oxygen tent was employed much of the time. On the morning of September 25 the patient's breathing became especially difficult and sporadic. The ventricular rate suddenly dropped to 24 beats per minte and then to 12. The child died quietly at that time.

Report of Autopsy.—Significant postmortem observations were limited to the heart. No free pericardial fluid was present in the pericardial sac. The entire mediastinum, including the lungs and the heart, was removed in toto. The dilated right auricle was opened first, and the ostiums of the venae cavae were easily identified. A tiny tricuspid opening, barely admitting the tip of a probe, communicated with a small blind pouch, the capacity of which was estimated to be not more than 0.5 cc. It was located at the usual site of the tricuspid valve. This pouch was thought to be possibly a rudimentary right ventricle but most probably an artefact. The foramen ovale was widely patent and somewhat dilated and was the only communi between the right auricle and the rest of the The mitral valve opened into a common, single tricular chamber (the left ventricle). The aortic contained the usual three cusps and did not altered in any way. There was complete atre the ostium of the pulmonary artery, which was fo be only a small blind pocket adjacent to the asc portion of the aorta. There was no evidence wh of a pulmonary valve. The arch of the aort widely dilated. The ductus arteriosus was pate

The flow of blood through the heart, therefore as follows: from the superior and inferior venae into the dilated right auricle, thence through the foramen ovale into the left auricle, through a n appearing mitral valve into a single (left) ve and thence through a relatively normal-appearing valve to a dilated aortic arch. From here a



Schematic representation of the congenital anom described (arrows indicate the course of flow of bl (*1*) dilated aortic arch; (*2*) auricular appendage; superior vena cava; (*4*) inferior vena cava; atresia of tricuspid valve; (*6*) dilated foramen o (*7*) normal mitral valve; (*8*) pulmonary vein; atresia of ostium of pulmonary artery; (*10*) p ductus arteriosus; (*11*) pulmonary artery.

ductus arteriosus communicated and joined with atresic pulmonary artery, bringing blood to the l

The aortic valve measured 2.4 cm. and the m valve 3.6 cm. in circumference. The left wall o ventricle measured 1 cm. and the right wall 0.5 in thickness.

The pathologic diagnoses were: Cor biatrium oculare, dilatation of the right auricle, dilatation o (left) ventricle, atresia of the tricuspid valve, p foramen ovale, atresia of the ostium of the pulm artery, patent ductus arteriosus and dilatation o aortic arch.

COMMENT

was pointed out in the introductory para- of this paper, defects of the interventricu- ptum usually are not accompanied by heart . Even when there is complete absence e interventricular septum, as in this case, undle may be found running along the tag e rudimentary septum. It is only when is destruction or fusion of the pos- endocardial cushion of the atrial canal and nnulus fibrosis that heart block results from interruption of the bundle. Although it was not here demonstrated, this was probably the pathogenesis in this case.

SUMMARY

An infant was observed with congenital complete heart block associated with multiple cardiac abnormalities. The condition appears to be rare; it is suggested that the probable pathogenesis of the heart block lay in a destruction or fusion of the posterior endocardial cushion of the atrial canal and the annulus fibrosis.

ROSEOLA INFANTUM (EXANTHEMA SUBITUM) COMPLICATED BY HEMIPLEGIA

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Roseola infantum, a common disease of infancy and early childhood, was first described by Zahorsky,[1] in 1910. This syndrome did not attract much attention until Veeder and Hempelmann[2] published their paper, in 1921. These authors suggested the name exanthema subitum and were the first to describe the characteristic changes in the blood that always accompany the disease. The illness was not considered contagious until Cushing[3] observed an outbreak in one of the wards of the Montreal Foundling Hospital in 1925. No complications of the disease have been reported up to the present time. The occurrence of a cerebral complication is the reason for the present report of a case.

Blood Counts

Date, 1944	Red Blood Cells	Hemoglobin		White Blood Cells	Segmented Forms, per Cent	Stab Forms, per Cent	Eosinophils, per Cent	Basophils, per Cent	Lymphocytes, per Cent	Monocytes, per Cent	
		Per Cent	Gm.								
June 9	3,710,000	84	.....	3,800	25.0	34.0	1.0	...	25.0	15.0	
10	4,240,000	86	.....	1,800	1.0	19.0	...	...	63.0	17.0	
11	4,200,000	84	12.18	2,700	....	3.0	...	...	86.0	11.0	
12	4,300,000	85	12.33	3,100	6.0	2.0	...	...	81.0	11.0	
13	4,250,000	81	.....	6,000	4.0	1.0	...	...	89.0	6.0	
14	4,070,000	82	11.86	6,400	6.0	4.0	...	1.0	81.0	8.0	
15	4,050,000	82	11.89	7,800	13.0	10.0	1.0	1.0	65.0	10.0	
16	4,180,000	85	12.33	9,850	28.0	6.0	...	...	59.0	7.0	

GENERAL CONSIDERATIONS

Etiology.—The cause of roseola infantum is unknown, but the condition is generally ascribed to infection with a virus.

Symptoms and Physical Signs.—The diagnosis is not difficult; therefore the condition should not be mistaken for any other disease. It is a distinct clinical entity and occurs in children under the age of 2 years. The onset is sudden and is accompanied with fever and restlessness. The duration of the fever is approximately three days, after which as a rule it drops by crisis. A macular rash appears after the drop in temperature, and there is a characteristic blood picture. The blood count is characterized by l penia plus relative lymphocytosis. The l cyte count may fall below 3,500 per cubic meter.[4] The patient in the present case sh a white cell count of 1,800 on the second and a lymphocyte count of 97 per cent o third day. Yoshina[5] reported a white cell of 800, which I believe is the lowest rec The relative lymphocytosis is more constant the reduction in the white cell count.[6] G mann[7] reported a mononuclear cell count as as 98 per cent. After the eruption the picture rapidly returns to normal. This acteristic is illustrated in the present case; rapid rise in the number of white cells is sh in the table.

The typical blood picture, with the absen clinical signs, in a child under 2 years o enables the physician to forecast the diag before the appearance of the rash. The nosis in the present case was made on the tient's admission to the hospital.

REPORT OF CASE

L. B., a girl aged 19 months, was admitted t Israel Zion Hospital on June 9, 1944, because o vulsions.

History.—The patient was born at term and had a mal, spontaneous delivery. Her weight at birth w

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2. Veeder, B. S., and Hempelmann, T. C.: A Febrile Exanthem Occurring in Childhood (Exanthem Subitum), J. A. M. A. **77**:1787 (Dec. 3) 1921.
3. Cushing, H. B.: Canad. M. A. J. **17**:905, 1927.
4. Zahorsky, J., in Brennemann, J.: Practi Pediatrics, Hagerstown, Md., W. F. Prior Com Inc., 1944, vol. 2, chap. 21, p. 5.
5. Yoshina, T.: Hawaii M. J. **1**:235, 1942.
6. Barenberg, L. H., and Greenspan, L.: Exan Subitum (Roseola Infantum), Am. J. Dis. Child. 5 (Nov.) 1939.
7. Glanzmann, E.: Ergebn. d. inn. Med. u. Ki **29**:65, 1926.

ls (3,175 Gm.). She sat up at 5 months, began to at 8½ months and talked at 11 months.

esent Illness.—The child was apparently well until orning of June 8, 1944, when her temperature sud- rose to 103 F. and she had a generalized convul- which lasted about ten minutes. That afternoon ppeared somewhat better. At about 8 p. m., twelve after the onset of her illness, the child had another lsion, lasting about two hours. At midnight she third convulsion, and at this time hospitalization advised. She was admitted to the hospital in a rous state at 1 a. m. on June 9, seventeen hours the onset of her illness. Phenobarbital sodium given hypodermically before her admission. At a. m. the child had another convulsion, which con- d until 5 a. m., and for the control of which ether administered. I examined her on the morning of 9.

ysical Examination.—The child seemed alert and in general condition. Except for slight congestion of onsils nothing abnormal could be found. Lumbar ure revealed clear fluid under normal pressure.

boratory Data.—The spinal fluid showed normal nts of albumin and sugar, with no cells.

e blood count showed 3,710,000 red blood cells per millimeter, 84 per cent hemoglobin (Sahli) and white blood cells per cubic millimeter. The dif- ial count showed 34 per cent stab forms, 25 per egmented forms, 1 per cent eosinophils, 25 per cent hocytes and 15 per cent mononuclear leukocytes.

neral Impression.—My impression was that the had initial convulsions, possibly secondary to rose- fantum.

ferential Diagnosis.—The diagnosis of roseola in- n was made prior to the appearance of the exan- mainly on the basis of the picture of acute infec- with a rise of temperature, and a characteristic blood cell count, with leukopenia and a relative se in lymphocytes. The diagnosis of agranulo- s was considered but was ruled out because of the eing of the child and the smallness of the dose of iazine that had been administered.

atment.—Administration of sulfadiazine, which the had received, was discontinued and acetylsalicylic substituted.

rse.—On the day of the patient's admission her erature rose to 104.8 F. On the following day her st temperature was 104.2 F. Examination still d nothing abnormal. The white blood cell count o 1,800 per cubic millimeter, and the number of anular cells rose to 80 per cent. These observa- in my opinion, were even more suggestive of a infantum than were the previous symptoms.

the fourth day of the illness the patient's tempera- was 102.4 F. at 4:00 a. m. and dropped to 99.8 F. on. In other words, the temperature receded by (chart). At 1:45 p. m., after the patient's tem- re had returned to normal, a nurse noticed weak- of the left arm and leg. I examined the child at m.: She had definite left hemiplegia; the knee were active; an equivocal Babinski reaction was t on both sides, and the abdominal reflexes were icited. The blood count on this day revealed 2,700 cells, with 3 per cent stab cells and 97 per cent anular cells.

e patient's temperature remained normal. About e hours after the drop in temperature a macular was noticed over the neck and back, which rapidly d over the rest of the body.

On June 13 the rash began to disappear; it vanished completely within another twenty-four hours. This event confirmed the diagnosis of roseola infantum.

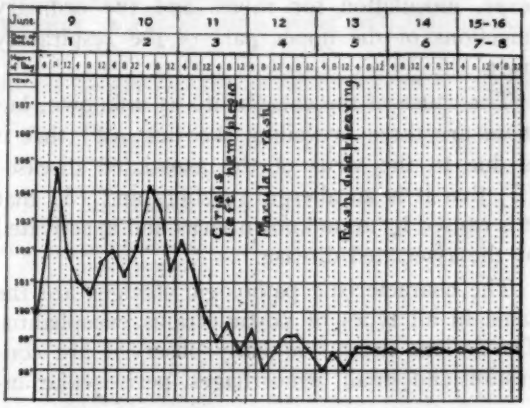
During the next few days there was slight improvement in the hemiplegia. On her discharge, on June 16, the patient was able to move her left arm slightly. She refused to stand on her left foot. The neurologic picture was unchanged.

There was a progressive rise in the number of white blood cells and polymorphonuclear cells (table).

I examined the child on June 20. She refused to use her left upper extremity and walked only when aided, dragging her left leg. There was no apparent weakness of the left side of the face.

She was examined again on July 29; at this time definite improvement was noticeable. She moved her left upper extremity and walked with support, still dragging the left leg slightly.

When examined again one month later, the child walked well unassisted and had apparently recovered from her left hemiplegia.



Patient's temperature chart.

COMMENT

All authors, in discussing this condition, emphasize the absence of complications. A concomitant infection of the respiratory tract, with all its complications, such as otitis media, cervical adenitis and pneumonia, may occur. In a few cases severe nervous symptoms have been observed. In some cases the patient has shown bulging fontanels, and meningitis was suspected.[7] Wallfield [8] reported a case in which the disease was ushered in by symptoms which simulated encephalitis. Faber and Dickey [9] stated that severe nervous symptoms, such as malaise, drowsiness, insomnia, headache, vomiting and severe convulsions, may develop. Convulsions are initial and are not of infrequent occurrence. Greenthal [10] reported the incidence of initial convulsions as 6 per cent in a series of 100 cases. The convulsions may be severe and may recur.

8. Wallfield, M. J.: J. Pediat. **5**:800, 1934.
9. Faber, H. K., and Dickey, L. B.: Arch. Pediat. **44**:491, 1927.
10. Greenthal, R. M.: Wisconsin M. J. **40**:25, 1941.

In 1 case, reported by Faber and Dickey, there were three convulsions in four hours. In the case reported here there were four severe convulsions in twenty hours.

The conditions just mentioned are concomitant symptoms or coincidental infections, and not complications of the disease. The occurrence of hemiplegia on the fourth day of the illness has never before been reported; it is a real complication of the disease and is probably due to encephalitis.

Encephalitis associated with acute infectious diseases has been known for many years, and cases have been recognized and reported during the last twenty years. Encephalitis has been observed following measles, rubella, chickenpox, pertussis, vaccination for smallpox, undulant fever, inoculation for rabies and the ordinary infections of the upper part of the respiratory tract.

The cause of the encephalitis is unknown, but there are three prevailing theories: (1) that it is due to the virus of the associated disease; (2) that it is an allergic reaction, and (3) that it is caused by an unknown virus and is activated by the associated disease.

The characteristic pathologic changes are the same in all types of postinfectious encephalitis. The lesions most frequently observed are congestion and small hemorrhages, perivascular infiltration and perivascular demyelination.[11] nam[12] has shown that the parenchymal ch may be due to closure of small vessels i central nervous system.

SUMMARY

A girl 19 months old had roseola infan Her case differed from all previously rep cases of the disease in that it was compli by left hemiplegia. Aside from this, the d followed its usual course, with a sudden o accompanied with fever and convulsions, seizures being recurrent during the first t hours. Examination of the blood disc severe leukopenia and lymphocytosis. course was typical, with a drop in temper by crisis on the fourth day, followed by a acteristic rash.

This case is reported because of the compl ing left hemiplegia. Not only is it the first reported in which this complication occ but it is the first in which a complication o sort is known to have been associated roseola infantum. The complication disapp completely after ten weeks.

Encephalitis is considered the most likely c of the hemiplegia.

161 Rugby Road.

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Progress in Pediatrics

ASCARIASIS

CLINICAL SURVEY OF ONE HUNDRED AND TWENTY-FIVE CASES OF INFECTION WITH ASCARIS LUMBRICOIDES IN CHILDREN

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ne cannot practice pediatrics in Panama ut being impressed by the frequency of in- n with intestinal parasites, particularly ris lumbricoides. Although excellent reviews appeared in the literature, a survey limited e condition in children is of value in order rify some of the existing misconceptions re- ng the symptoms and prognosis of ascariasis.

SOURCE OF MATERIAL

is study was based on data obtained from 125 nts with ascariasis admitted to the pediatric wards rgas Hospital, Ancon, Canal Zone, between Jan. 1, and Jan. 1, 1944. Although Ascaris lumbricoides found frequently in association with other para- i. e., Trichuris trichiura, Necator americanus, robius vermicularis and Strongyloides stercoralis, nts with multiple infection were excluded from this

ere exists in the Canal Zone a system of federally nistered medical care for Government employees heir families. No socioeconomic selection of patients made in this series, and all groups were repre- d. Racially, the patients were white, Negro and mix- of white, Negro, Indian and Oriental strains. For enience, they were classified as white, Negro and izo.

CLINICAL CONSIDERATIONS

ocation of Dwellings.—The communities which the patients came were of three s, as follows:

United States Government communities lo- d in the Canal Zone, characterized by minimal vding, excellent toilet and sewage disposal ities, paved streets and landscaped yards.

Principal cities of the Republic of Panama lón and the city of Panamá). In the center hese cities overcrowding among the poorer ents is commonplace, facilities for sewage osal are adequate, although not used to the st extent by an uninformed populace, and ets and alleys are paved. In the outskirts of e cities, however, facilities for sewage dis- posal are minimal; streets unpaved and land- scaping absent.

3. Rural or semirural communities in the Canal Zone and the Republic of Panama (interior), where population is sparse, living conditions primitive and sanitation conspicuous by its absence, even outhouses being seen infrequently.

TABLE 1.—*Age Incidence in 125 Patients with Ascariasis*

Age	No. of Patients
11 months	1
1 year	4
1 year 2 months	2
1 year 3 months	2
1 year 4 months	4
1 year 5 months	1
1 year 6 months	7
2 years	15
3 years	21
4 years	9
5 years	15
6 years	9
7 years	4
8 years	3
9 years	4
10 years	9
11 years	6
12 years	9

In order to determine whether type or location of dwellings has any causal relation to ascariasis, the available data from this series of 125 patients were analyzed. It was found that a total of 77, or 61.6 per cent, of the patients lived on farms or in rural communities in the Canal Zone or in the interior of the Republic of Panama. At least half of these 77 patients lived on small farms located in semijungle-like areas. Fifteen, or 12 per cent, came from United States Government communities in the Canal Zone, where sewage disposal was adequate. The remaining 33 patients, or 26.4 per cent, named large cities in the Republic of Panama as their residences.

Age.—The age distribution of the patients in this survey is shown in table 1. The youngest patient was an 11 month old girl, who died from a heavy infection and resultant complications. Twenty-one, or 16.8 per cent, of the patients

rom the Pediatric Section of the Medical Service, as Hospital, Ancon, Canal Zone; Col. Wilmer C. belbies, commanding.

became infected before the age of 18 months, and 66, or 52.8 per cent, before the age of 4 years; these figures indicate a relatively high frequency of ascariasis early in life.

Sex.—Sixty-eight, or 54.4 per cent, of the present series were boys, and 57, or 45.6 per cent, were girls. Below the age of 4 years, when 66 of the 125 patients were infected with Ascaris, the sex distribution was equal, with 33 boys and 33 girls.

SYMPTOMS

The symptoms were difficult to evaluate because most of the patients were brought to the hospital for diagnosis and treatment of other diseases and not because of infection with Ascaris. A total of 99, or 79.2 per cent, were brought in with conditions other than ascariasis, and only 26, or 20.8 per cent, with symptoms later accounted for by infection with Ascaris alone. Of the unrelated associated diseases (table 2) malaria was the most frequent (it was present in 69 patients, or 55.2 per cent). Next in frequency were infections of the upper and the lower respiratory tract, which occurred in 20, or 16 per cent, of the patients.

Because of the frequency of associated unrelated diseases, it was difficult to classify symptoms accurately and to state whether they were due to ascariasis or to associated unrelated disease. In many instances the symptoms could have been due to either or to both. They were divided, therefore, into three groups, as follows: (1) symptoms presumably due to ascariasis, (2) symptoms which could be due to either ascariasis or associated unrelated disease (table 3) and (3) symptoms which must be due to unrelated disease. A liberal attitude was maintained, and all symptoms which could not be explained by the unrelated disease were listed under ascariasis. The third group included such complaints as chills and fever, headache, sweats, somatic pains, delirium, rhinorrhea, purulent discharge from the ears, cutaneous rash and sore throat. This aggregate seemed to bear no obvious relati ascariasis; hence it was eliminated from sideration. The second group of sympto those attributable either to ascariasis or to

TABLE 2.—*Incidence of Associated Unrelated Diseases in 125 Children Infected with Ascaris Lumbricoides*

Disease		No. of Patients
Estivoautumnal malaria		46
Tertian malaria		23
Infections of respiratory tract		20
Rhinopharyngitis	11	
Bronchopneumonia	3	
Lobar pneumonia	2	
Tonsillitis	2	
Bronchitis	2	
Acute communicable diseases		6
Miscellaneous conditions		4
Total		99
Ascariasis, unassociated		26

TABLE 3.—*Frequency of Symptoms Due to (1) Ascariasis Alone and (2) Either Ascariasis Ascociated Unrelated Disease*

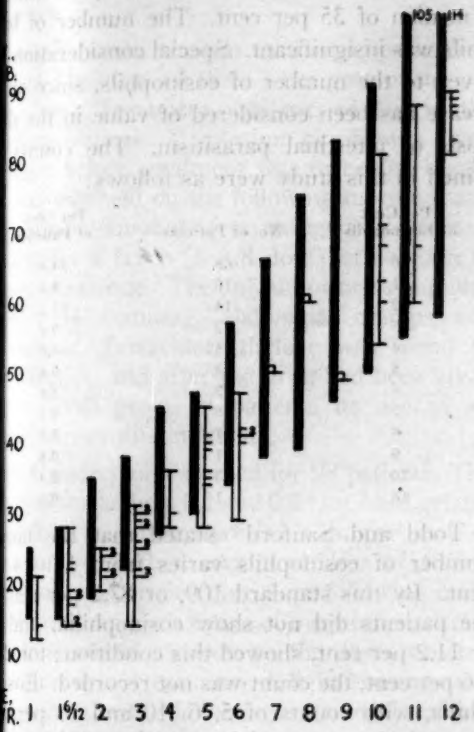
Symptoms	Frequency Due to Ascariasis Alone	Per Cent	Frequency Due to Either Ascariasis or Associated Unrelated Disease	Total
Passing worms by bowel	24	19.2	..	28
(a) Worms by mouth and bowel	4	3.2	..	..
Vomiting	12	9.6	3	28
(a) Vomiting worms	9	7.2	..	..
(b) Worms by mouth and bowel	4	3.2	..	..
Fever	13	10.4	1	14
Anorexia	9	7.2	2	11
Abdominal pain	10	8.0	0	10
Diarrhea	9	7.2	0	9
Loss of or failure to gain weight	6	4.8	2	8
Cough	3	2.4	4	7
Convulsions	4	3.2	2	6
Restlessness	4	3.2	0	4
Apathy, weakness	1	0.8	2	3
Distention	1	0.8	1	2
Bloody diarrhea	2	1.6	0	2
Choking	1	0.8	0	1
Excessive appetite	1	0.8	0	1
Frequency	1	0.8	0	1
Itching in throat	1	0.8	0	1

* In order to reduce to a minimum the possibility of regarding important observations, the two groups have been combined so as to give the maximum frequency of symptoms in ascariasis.

ciated unrelated disease—could not be elimin without introducing the possibility of discar important and relevant observations. It see reasonable, therefore, to combine this se group with the groups of symptoms presume be due to ascariasis (table 3). By that proce it was hoped to obtain a more accurate inde the symptoms of ascariasis.

Abdominal pain and vague abdominal dis have been considered the most frequent ga intestinal symptoms of ascariasis. In this s of patients the two most frequent symptoms passing of worms by bowel and vomiting. former symptom occurred in 28 patients (per cent), 18 of whom were brought to the pital for unrelated disease, the history of pa worms being obtained incidentally. Vom was of almost equal importance as a sympto occurred in 28 patients, or 22.4 per cent, of w 13, or 10.4 per cent, vomited worms. Incl in this total are 4 patients who vomited w as well as passed them by bowel. Abdom pain was observed in only 10 patients, or 8

Anorexia was encountered in 11, or 8.8 ent. In 1 child the complaint on his admis- to the hospital was excessive appetite with iated loss of weight. Diarrhea was seen in r 8.8 per cent; parents of 2 of these patients ibed bloody diarrhea. Pronounced abdomi- istention was observed in 2 children, 1 of n died of peritonitis (case 3). The other had ere infection with Ascaris and tuberculous



1.—Range of weights of boys infected with is lumbricoides (white columns) contrasted with l range of weights of boys of similar age (black ns), as obtained from Baldwin-Wood tables. ontal linear extensions indicate values for single ts; numerals on these lines indicate total num- f patients of similar weight.

onitis. Even after three courses of treat- with hexylresorcinol and repeated exami- ns of stools, none of which showed worms, derable distention persisted. Undoubtedly s due to tuberculosis rather than to ascari- Choking was observed in 1 child; only the y and judicious intervention of a nurse pre- d this patient from being suffocated by s that had been vomited and had lodged in rynx.

lnutrition was frequently observed, but ions relating to degree and frequency could e settled with accuracy or finality. In fig- 1 and 2 are shown the weights of the chil- in the present study; for convenience in g a comparison the range of average nor- mal weights as given in the Baldwin-Wood[1] tables has been shown. The heights and other measurements are not known, as these figures were not routinely obtained in the pediatric service. In spite of this deficiency, it is possible to make the general statement that malnutrition was a common condition in this group, particularly among the younger children. The physicians who made the initial examinations recorded that 54, or 43.2 per cent, of the patients were underweight, poorly nourished or malnourished and an additional 12, or 9.6 per cent, fairly well nourished. Ten of the poorly nourished patients had no disease other than ascariasis. Twenty-two had malaria, which could have contributed to the underweight. However, observations on an 11 month old baby, weighing 13 pounds (5,000 Gm.); 2 babies each 14 months old weighing 14 pounds (6,350 Gm.); a 3 year old child weighing 14 pounds (6,350 Gm.); three other 3 year old children weighing 21 or 22

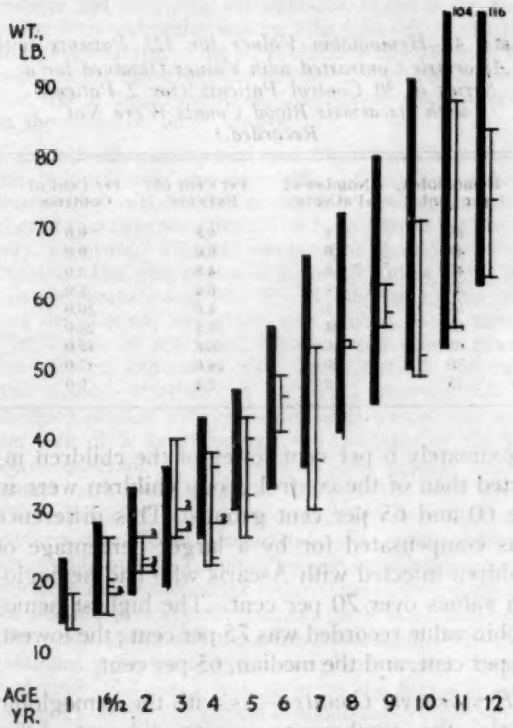


Fig. 2.—Range of weights of girls infected with Ascaris lumbricoides (white columns) contrasted with normal range of weights of girls of similar age (black columns) as obtained from Baldwin-Wood tables. Horizontal linear extensions indicate values for single patients; numerals on these lines indicate total number of patients of similar weight.

pounds (9.5 or 10 Kg.) each; a 7 year old child, weighing 30 pounds (13.6 Kg.), and other simi-

1. Baldwin, B. T., and Wood, T. D.: Weight-Height-Age Tables, New York, American Child Health Association.

lar patients, some with and some without associated unrelated disease, led to the conclusion that ascariasis is accompanied with considerable malnutrition.

LABORATORY DATA

Hemoglobin Determinations.—Estimations were made by the Tallqvist technic in most instances and were available for 123 patients. The values obtained are given in table 4. It can be seen that a total of 20, or 16 per cent, of the patients had hemoglobin values below 60 per cent. Exactly the same per cent prevailed in a control group consisting of 30 children admitted to the surgical service with simple, uncomplicated fractures and free from medical disease. Of the 20 children with low hemoglobin values, 13 had malaria; 1, bronchopneumonia; 1, cellulitis of the face, and 1, tuberculous peritonitis. The remaining 4 had no disease but ascariasis. The child with a hemoglobin value of 35 per cent had severe recurrent estivoautumnal malaria. Approximately 6 per cent fewer of the children infected than of the control group children were in the 60 and 65 per cent groups. This difference was compensated for by a larger percentage of children infected with Ascaris who had hemoglobin values over 70 per cent. The highest hemoglobin value recorded was 75 per cent; the lowest, 35 per cent, and the median, 65 per cent.

TABLE 4.—*Hemoglobin Values for 123 Patients with Ascariasis Contrasted with Values Obtained for a Series of 30 Control Patients (for 2 Patients with Ascariasis Blood Counts Were Not Recorded.)*

Hemoglobin, per Cent	Number of Patients	Per Cent of Patients	Per Cent of Controls
35	1	0.8	0.0
40	0	0.0	0.0
45	6	4.8	3.0
50	8	6.4	3.0
55	5	4.0	10.0
60	24	19.2	25.0
65	46	36.8	42.0
70	30	24.0	17.0
75	3	2.4	0.0

Erythrocyte Counts.—As with the hemoglobin levels, the erythrocyte counts did not differ materially from those of the control group. The patients with erythrocyte counts below 3,200,000 were the same 20 already mentioned as having low hemoglobin values. The lowest erythrocyte count observed was 1,400,000; the highest 5,000,000, and the median, 3,800,000.

Leukocyte Counts.—The total number of leukocytes varied from 3,300 to 33,800, with a median of 7,600 and an average of 9,190. Over one half of the counts were under 9,000. The average count for 26 patients with uncomplicated ascariasis was 8,300, although counts of 15,500 to 16,000 were obtained for 2 patients. In many instances deviations from the normal count were caused by unrelated presenting diseases.

Differential Leukocyte Counts.—The number of neutrophils varied from a low of 32 per cent to a high of 93 per cent, with a median of 63 per cent. The number of lymphocytes and monocytes combined varied from 7 to 68 per cent, with a median of 35 per cent. The number of basophils was insignificant. Special consideration was given to the number of eosinophils, since an increase has been considered of value in the diagnosis of intestinal parasitism. The counts obtained in this study were as follows:

Per Cent of Eosinophils	No. of Patients	Per Cent of Patients
0	68	54.4
1	10	8.0
2	14	11.2
3	12	9.6
4	5	4.0
5	1	0.8
6	7	5.6
7	0	0.0
8	1	0.8
9	1	0.8
10	3	2.4
16	1	0.8

Todd and Sanford[2] stated that the normal number of eosinophils varies from 1 to 4 per cent. By this standard 109, or 87.2 per cent, of the patients did not show eosinophilia, and 14, or 11.2 per cent, showed this condition; for 2, or 1.6 per cent, the count was not recorded. Eosinophilia, with counts of 5, 6, 10 and 16 per cent respectively, occurred in 4 patients with ascariasis alone; however, this condition did not necessarily imply severe infection with Ascaris.

Examinations of Stools.—All the patients in this series showed ascarial ova in the stools. For a few other patients a history of vomiting or passing of large roundworms by bowel was obtained, but repeated examinations of stools failed to reveal ova. None of these patients was included in the present study, nor was any included whose stools revealed ova of other parasites in addition to those of Ascaris.

TREATMENT

Three drugs were used in treatment: (1) oil of chenopodium, (2) tetrachloroethylene and (3) hexylrescorcinol crystals.

Oil of chenopodium was given to 8 patients in doses varying according to the patient's age. Magnesium citrate was administered at 11 a.

2. Todd, J. C., and Sanford, A. H.: Clinical Diagnosis by Laboratory Methods, ed. 10, Philadelphia, W. B. Saunders Company, 1943, pp. 278-279.

he day before treatment was to begin. Breakwas withheld on the following day, and the was given at 6 a.m. and was followed in hours by a second dose of purgative. Food withheld until after brisk catharsis had ocred. Vomiting occurred with 4 patients, inal cramps with 2 patients and prostration 2 patients. In 2 patients infection persisted, ssitating a change to another drug (hexylrcinol).

Tetrachloroethylene was used for 15 patients in es of 3 minims (0.18 cc.) per year of the pat's age. Treatment was carried out in the owing manner: Magnesium citrate was given night before treatment was to begin; breakwas withheld on the following morning, and measured amount of vermifuge was administed under a layer (a full dose) of solution of gnesium citrate. The only untoward symptoms ed were vomiting, abdominal cramps and stration. Tetrachloroethylene was found to ineffective, and after the drug had been given this small group of patients its use as an aricide was discontinued.

Hexylresorcinol was used for 98 patients. The g was available in 0.1 and 0.2 Gm. hard gelatin sules. The doses were 0.1 Gm. per year of arent age, with a maximum dose of 1 Gm. atment was carried out in the following man: A preliminary laxative of magnesium citrate administered at noon on the day preceding beginning of treatment. A light evening meal given. On the following morning breakfast withheld, and at 6 a.m. the correct number of sules was given as one dose. A laxative, gnesium citrate, was given twenty-four hours r treatment to remove moribund and dead rms. If severe infection was present, an enema given in addition to the second dose of ate. The capsules were either swallowed le with water or, with younger patients, ined directly into the esophagus by a physician. s procedure prevented rupture of the capsule, h consequent chemical irritation of the mouth lips. One patient vomited shortly after the g was administered, and severe irritation of mouth and lips occurred. Aside from infrent vomiting, no serious toxic symptoms were erved.

Although follow-up care for this group of pats was grossly inadequate, no treated patient discharged from the hospital until examinas of the stools revealed absence of ova. To patients two courses and to 2 patients three rses of hexylresorcinol were administered be the stools become negative for ova.

REPORT OF CASES WITH AUTOPSY[3]

Autopsies were performed on 4 patients. In 2 patients the cause of death was unrelated to ascariasis, while in the remaining 2 patients the cause of death was ascariasis and its complications. Although postmortem examinations were complete, only pertinent observations have been summarized for the purpose of this report.

CASE 1.—A 2 year old mestizo girl was admitted to the hospital with laryngeal diphtheria. She died two hours after her admission.

At autopsy the expected observation of laryngeal diphtheria resulting in death was made. There were 3 adult Ascarides lumbricoides in the jejunum, but no inflammatory reaction was detected in any portion of the bowel on either gross or microscopic examination. No larvae were noted in the lungs or other viscera.

CASE 2.—A mestizo boy aged 2 years was admitted to the hospital with a history of fever of four days' duration. A clinical diagnosis of estivoautumnal malaria, congenital malformation of the heart and intestinal parasitism was made. The child died nine hours later.

At autopsy the expected conditions of estivoautumnal malaria and congenital malformation of the heart defect of the intraventricular septum with mild decompensation were encountered. One adult Ascaris lumbricoides was noted in the ileum, but the mucosa of the small intestine was free from inflammation. No larvae were observed in the lungs or other viscera.

CASE 3.—A mestizo boy aged 2 years was admitted to the hospital with the complaints of passing of large worms by bowel for one month and vomiting and diarrhea of two days' duration. The remainder of his history was irrelevant. Physical examination gave the following data: His weight was 14 pounds 8 ounces (6.6 Kg.). His temperature was 98.6 F. He showed malnutrition and dehydration, and there was loss of tissue turgor. The outline of his small intestine was visible against the anterior abdominal wall, and intestinal peristalsis was noted. Portions of the small intestine felt as though distended with masses of large worms; one mass the size of a small orange was palpable in the left lower quadrant of the abdomen, and several smaller masses were noted along the course of the small bowel. The hemoglobin was 60 per cent; there were 3,700,000 erythrocytes, 9,850 leukocytes, 72 neutrophils, 3 eosinophils and 25 lymphocytes per cubic millimeter of blood. A smear stained for malarial parasites and the test for sickling gave negative results; the Wassermann reaction was negative and the urine was normal. The stool contained numerous ova of Ascaris lumbricoides. Hexylresorcinol (0.2 Gm.) was given on the first and sixth mornings after the patient's admission. Vomiting of worms, passing of worms by bowel, marked abdominal distention and bloody diarrhea persisted throughout his illness. Dehydration was severe, necessitating almost daily parenteral administration of fluids. The patient's temperature fluctuated widely, between 98.6 and 103 F. Death occurred ten days after his admission. During the period of hospitalization this patient vomited a total of 15 worms and passed 75 more by bowel.

Gross Autopsy Observations.—Pleurae: Dense, sticky adhesions were present between the diaphragm and the inferior surface of the lower lobe of the left lung.

3. Col. L. B. Bates, chief of the Board of Health laboratory, has given permission for the use of this material.

Peritoneum: About 30 cc. of sticky, grayish green exudate was present throughout the peritoneal cavity. The intestines were matted together with friable, sticky adhesions, and portions of them were adherent to the anterior abdominal wall. Purulent exudate was most abundant in the left iliac fossa, the pelvis and the perirenal region. On the surface of the loops of small intestine in the left upper quadrant of the abdomen was an adult roundworm 20 cm. in length and nonadherent to any of the intraperitoneal structures. The inferior surface of the liver was attached by adhesions to the anterior surface of the colon and stomach. A coiled adult roundworm, 22 cm. in length, was attached to the inferior surface of the left lobe of the liver by the same type of adhesions. When this worm was removed partially, a groove for it was noted on the inferior surface of the liver. Wedged between the inferior surface of the left lobe of the liver, the stomach and the colon was the appendix, measuring 4.5 cm. in length, 1.3 cm. in width at the base and 0.7 cm. in width at the tip. Through a perforation at the tip of the appendix projected the head of a roundworm. The head portion, projecting into the peritoneal cavity, was 10.5 cm. in length. A large amount of foul, greenish exudate surrounded both worm and appendix. The cecum had undergone incomplete rotation and descent and was in the right upper abdominal quadrant beneath the right lobe of the liver. The right iliac fossa was occupied by a loop of small intestine. A coiled adult roundworm, covered almost completely with exudate, was attached to the serosal wall of the midportion of the transverse colon. It was separated from the serosa with moderate difficulty. Along the greater curvature of the stomach, completely covered with relatively firm adhesions, there was an adult roundworm, 16 cm. in length and extending from the pyloric region almost to the fundus. Actually, this worm was wedged between the left half of the transverse colon and the greater curvature of the stomach. An adult roundworm, surrounded by a pool of pus, was present in the pelvis. Generalized peritonitis existed.

Liver: The edge of the liver extended 20 cm. below the costal border. Glisson's capsule, especially on the inferior surface of the liver, was covered with sticky purulent exudate. The viscus was firm, the cut surface was yellow, and the lobular markings were indistinct. The gallbladder was normal.

Esophagus: The mucosa was moderately injected. An adult roundworm occupied most of the lumen of the esophagus and projected into the pharynx.

Stomach and Intestines: Four adult roundworms were observed in the stomach. The mucosa was coated with a small amount of sticky, brownish black material. No pyloric lesions were noted. A total of 79 adult roundworms were noted in the small and large intestines. Most of them were in the cecum and the transverse colon.

Bacteriologic Examination.—From the peritoneal exudate Streptococcus haemolyticus and organisms of the Bacillus coli aerogenes group were cultured. From the blood Staphylococcus aureus haemolyticus was cultured.

Microscopic Examination.—Lungs: A few alveoli were filled with serous exudate; the septal capillaries were moderately congested, but no leukocytic infiltration was noted. Liver: Glisson's capsule was covered with a thick layer of fibrinopurulent exudate. The parenchymal architecture was well maintained, but there was moderately severe fatty infiltration of cells in all portions of the lobules, and areas of focal necrosis were seen.

Intestine: The serosal surfaces were coated with a fibrinopurulent exudate, and the connective tissue elements of the serosa were separated widely, as though by edema. There were no lesions of the mucosa or muscle layers, and the blood vessels were not conge

Anatomic Diagnoses.—The anatomic diagnoses as follows: (1) severe infection with Ascaris lu coides; (2) Ascarides lumbricoides in the esoph stomach, large and small intestine, appendix and toneal cavity; (3) perforation of the appendix; (4) eralized peritonitis; (5) diaphragmatic pleurisy, side, and (6) dehydration and emaciation.

CASE 4.—A mestizo girl aged 11 months was bro to the outpatient clinic with complaints of boils o scalp and fever of five days' and vomiting of two duration.

Physical examination revealed malnutrition and d dration, dyspnea and cyanosis. The child was 28 (71 cm.), in length and weighed 13 pounds (5,900 There was pronounced abdominal distention. pitalization was advised. This was refused by the ents, but they returned in a few hours, with the dead in their arms.

Gross Autopsy Observations.[4]—Skull: Groups of larvae, which proved to be the larvae of Ascaris bricoides, were observed in both mastoid antrums. the right antrum there was one such coil, measuring cm. in diameter. In the left there were 3, which ext well forward beneath the petrous roof and aver 0.2 cm. in diameter. No purulent exudate was not association with these parasites. The right tymp membrane was perforated and the left was intact. worms were observed in the external auditory ca The dura was of normal thickness and appear There was no exudate or edema beneath the arachnoid.

Brain: The consistency and the convolutional pa of the brain were normal. No localized lesions observed within the parenchyma. The ventricular tem was slightly distended with clear fluid; the cho plexus appeared normal, and the ependyma was sm

Lungs: All the lobes of the lungs were crepitant soft. The parenchyma was pale pinkish gray and tively dry. No gross parasites were seen in the enchyma or in the main bronchi.

Peritoneum: The lining of the peritoneal cavity smooth and glistening, and no exudate or excess was seen.

Liver: The liver was slightly enlarged and the border rounded. Glisson's capsule was intact, but neath it, especially on the anterior aspect of right lobe and the posterior aspect of the left lobe, 10 to 20 pale, ill defined and irregular elevated a Beneath these areas motile worms could be palpated seen through the thin capsule. Section into the enchyma revealed numerous parasites lying within biliary tract and ducts, as well as within encysted sp in the parenchyma. These cysts had brownish g necrotic walls and contained from 1 to 8 para measuring up to 0.1 cm. in diameter and from 2 to 4 in length. These worms were identified as As lumbricoides; an estimated 150 were present within liver. The remainder of the parenchyma was pale dish brown, with no distinct lobular pattern. gallbladder was distended with parasites, 45 in the longest of which measured 10 cm. in length 0.4 cm. in diameter and the smallest 1.5 cm. in le

4. Postmortem examination of this patient was formed by Major Robert L. Cavanaugh and Lt. S McKeown, who planned to publish this material in form of a case report. Because of the exigencies the war these officers were unable to carry out plans, and they gave their consent to the inclusion o material in the present communication.

1 cm. in diameter. The wall was thin; the cavity ned no mucoid or biliary material, and the worms were clean and yellowish white. The hepatic, and common bile ducts contained worms but patent. One worm protruded from the duodenal (see description of pancreas).

een: The spleen was normal.

creas: The pancreas was normal in size and n and was gray. The worm previously mentioned truding from the duodenal papilla was traced into ain pancreatic duct. One other worm present in ncreatic duct extended to the lateral third of the as.

estive Tract: The mucosa of the esophagus was h gray, and the lumen contained three small Ascarides lumbricoides. The stomach was dis- with clotted white material, resembling milk, in there were 20 worms. The duodenum contained wn, semifluid chyme, in which there were 38 worms. The remainder of the small intestine ined 181 worms, making a total of 242 worms in the alimentary canal. The mucosa and the of the small intestine were pale, and the lumen distended throughout. No ulcerations or other s were seen.

roscopic Examinations.—Brain: Sections from the al cortex, the basal ganglions and the cerebellum essentially normal. Some distention of the blood s of the leptomeninges and the brain substance erythrocytes was noted. No parasites or ova were ved in the vessels or the parenchyma.

ngs: There were considerable fibrosis and inflam- y exudate throughout most of the interalveolar a; these changes were most pronounced close e pleural surface. The predominant cells were cytes and other mononucleated cells; eosinophils not seen. The capillaries and large vessels were sted irregularly, with some punctate hemorrhages. s exudate filled the intervening spaces and some ent alveoli. The bronchioles were empty, and their elium was well preserved. No larvae were seen here in the sections examined.

er: Within the section of the liver examined was ity, which measured 0.4 by 0.7 cm. and contained sections of 2 small Ascarides lumbricoides. The lining of this cavity was composed of cellular s and a homogeneous mass of acidophilic substance. ining this was a highly cellular layer of lympho- large mononuclear and polymorphonuclear leuko- and occasional eosinophils, with strands of col- scattered throughout. The most external layer composed principally of degenerating or degenerated cells and strands of young fibrous tissue. Increased ar infiltration with lymphocytes, large mononuclear cytes and polymorphonuclear leukocytes, along with eration of fibrous tissue was present in the peri- l areas. There was evidence of regeneration of capillaries. In some of the portal areas smooth- cavities, in which the epithelium had been either oyed or compressed, suggested sites of former ment of worms. Bacteria were present irregularly l portions of the liver. The lobular pattern was al elsewhere, and the parenchymal cells stained The sinusoids appeared to be distended with l elements. Many Kupffer cells were filled with wish green pigment, and only a few glycogen oles were noted.

ncreas: The interlobular ductules of most of the eas were distended with exudative cells. Although of the cells were in varying stages of degeneration, erous polymorphonuclear leukocytes, lymphocytes other mononucleated cells could be recognized. e cells also infiltrated the adjacent interlobular connective tissue. Proliferation of connective tissue throughout the gland was moderately extensive; it was most noticeable in the interlobular areas around the efferent ducts. In three different areas on two slides examined the ducts were distended with worms. Here the mucosal cells were either flattened or entirely absent. There were increased proliferation of fibrous tissue and inflammatory cells around these ducts. The islets of Langerhans were normal in appearance and distribution. The parenchymal cells appeared functional.

Adrenals: Many clumps of blackish brown pigment were present in the medulla. The sinusoids were distended with blood cells.

Kidneys: The glomeruli were normal in distribution and appearance. No abnormalities were noted in the capsule or the stroma. The cells of the proximal convoluted tubules showed cloudy swelling and some fatty infiltration.

Small Intestine: In the section examined the mucosal cells were compact and clearly defined and stained well. The submucosa and the serosa appeared normal. No parasites or parasitic ova were noted.

Anatomic Diagnoses.—The anatomic diagnoses were as follows: (1) invasion of the middle ears, esophagus, stomach, duodenum, biliary and pancreatic ducts, liver, jejunum, ileum and large bowel with Ascarides lumbricoides; (2) malnutrition; (3) dehydration; (4) gaseous distention of the intestine; (5) subacute diffuse suppurative pancreatitis; (6) acute passive congestion of the adrenals and the kidneys, and (7) interstitial pneumonia involving all the lobes of the lungs.

COMMENT

Incidence.—As has been observed by Cort[5] and by Craig and Faust,[6] ascarides flourish where personal hygiene and living and environmental conditions are at a low level and combine to favor embryonation of the ova in a polluted soil. That over one fourth of the patients (26.4 per cent) named larger cities in the Republic of Panama as their residences was contrary to expectations. The figure obviously was misleading, for ascariasis is not a disease of cities with sanitation facilities. Three factors seemed to offer a plausible explanation: (1) Patients lived in districts of the city where hygiene and sanitation were open to question; (2) patients moved from one place to another frequently, and although their last address was in a sanitated area, closer investigation occasionally revealed that they had recently moved from or visited in an unsanitary area, and (3) the address given was often that of the father, who occupied temporary quarters near his place of employment, while his family actually lived in a rural or semirural area. Only 7, or 5.6 per cent, of the patients were white, while 46, or 36.8 per cent, were Negro and 72,

5. Cort, W. W.: Recent Investigations on the Epidemiology of Human Ascariasis, J. Parasitol. **17**:121-144 (March) 1931.

6. Craig, C. F., and Faust, E. C.: Clinical Parasitology, ed. 3, Philadelphia, Lea & Febiger, 1940, pp. 293-302.

or 57.6 per cent, mestizo. Furthermore, of 7 white patients who were infected with Ascaris, 3 gave histories of having been on vacation in the interior of the Republic for varying periods. All the white and a few of the mestizo patients lived where sanitation, personal hygiene and environmental factors were entirely satisfactory. Many of the Negroes lived where these factors were only fairly satisfactory. A few of the Negro as well as most of the mestizo children actually lived on the soil. This statement was so literally true that if a child came from an area known to be polluted, it was surprising not to find infection with Ascaris either alone or in association with other intestinal parasites.

Infection with Ascaris might occur as soon as a child was old enough to crawl about and come in contact with polluted soil. It was seen in 1 child of 11 months; so infection in this patient must have occurred at or before the age of 9 months. By the age of 4 years over one-half the patients in this series (52.8 per cent) had become infected. Just as children in this younger age group became infected more commonly than older children, so the infections in the younger group were heavier and the children more generally responsible for producing pollution of the soil.

Symptoms.—The symptoms of ascariasis have been classified as (1) those produced by migrating larvae and (2) those produced by adult worms. In some of the younger patients in this series infection was extremely severe, and it seemed plausible that not a few were being infected constantly by continuous or repeated exposure, so that combinations of the two groups of symptoms were seen. There were, for example, 3 patients with bronchopneumonia and 2 with lobar pneumonia. One patient with bronchopneumonia passed worms by bowel, and 1 with lobar pneumonia vomited worms as well as passing them by bowel. It is not asserted, however, that the pneumonias in these cases were due to the presence of larval forms in the lungs or were of the atypical lobular type called by Keller and his associates[7] Ascaris pneumonitis. Cough and fever, however, were among the more common symptoms, having been observed in 11.2 and 5.6 per cent of the patients respectively. Except in the patients with pneumonia, abnormal physical signs in the chest were observed rarely, and roentgenographic examinations of the lungs of 16 patients revealed essentially normal conditions. Sputum was examined in a few instances, but no larvae were demonstrated.

7. Keller, A. E.; Casparis, H., and Leathers, W. S.: A Clinical Study of Ascariasis, J. A. M. A. **97**:302-306 (Aug. 1) 1931.

The symptoms associated with migrating Ascaris larvae are those produced by lodgment in various organs of the body. Larvae have been reported in the brain, spinal cord, spleen, thyroid, kidneys and lungs. Their presence in the lungs is said to result in fever, rapid respiration, hemoptysis and physical signs of consolidation. Autopsies were performed on 4 patients in the present study, and, although the respiratory tract was examined carefully both grossly and microscopically, no larvae were demonstrated in any of the material. In patient 4, however, larvae were observed in the middle ears. Although larvae were found in the lungs, extensive fibrosis existed throughout most of the interalveolar stroma. This change could have resulted from an earlier invasion of the lung by such larvae.

The symptoms produced by adult worms may be divided into four groups, as follows: (1) general symptoms, (2) symptoms arising from sensitivity to absorbed foreign proteins, (3) nervous symptoms and (4) gastrointestinal symptoms. It should be emphasized again that 99, or 79 per cent, of the 125 patients studied were admitted to the hospital because of unrelated associated diseases and 26, or 20.8 per cent, with symptoms later found to be due to infection with Ascaris. It seemed, therefore, that in the majority of infected persons ascariasis either caused no conspicuous symptoms or was productive of symptoms which parents ignored or dismissed as of great importance. In general, it was observed that the younger the child, the more pronounced were his or her symptoms.

Many authors have associated such symptoms as pallor, circles under the eyes, poor development, faulty nutrition, mental and physical sluggishness, anemia and eosinophilia with ascariasis. Pallor, circles under the eyes, poor development or mental or physical sluggishness was not mentioned by a single parent in detailing the history of the child. In 66 instances examining internes and ward physicians mentioned underweight or malnutrition. In reality, it was difficult to evaluate the state of nutrition or the amount of underweight. Certainly, the average nutrition and weight of the 7 white children were comparable to averages encountered in the United States. There was nothing unusual or different about the growth and development of the 46 Negro children studied. Physicians who have practiced in Panama have created the impression that mestizo children there are slightly below average in height and weight, but there are no satisfactory tables or charts to substantiate such an assertion. Without proper measurements of height

not possible to determine either the degree nutrition or the number of children in this who were so affected. In spite of the de- ies, inspection of figures 1 and 2 suggests nderweight was a common condition in the er children among this group of patients.

se children were not considered anemic. globin levels and erythrocyte counts for he infected children and the controls seem o one unfamiliar with tropical pediatrics. only be said that such low figures are com- ace in the well children of the Canal Zone e Republic of Panama. Furthermore, these en look and act normal and resist attempts se the hemoglobin level by administration of r other hematinics. Eosinophilia was pres- 14, or 11.2 per cent. The total leukocyte fferential counts of neutrophils and lympho- were within normal range. Certainly, philia was no index of severity of infec- for some of the patients with most severe ions had either no eosinophils or only a l number.

sitivity to absorbed foreign proteins, gen- d toxemia and urticaria have been reported es of ascariasis. One of the present series of ts was brought to the hospital on his first at- f urticaria. The only disease found was mild ion with Ascaris, four worms being counted stool after he was treated with hexylresor- Toxemia of different degrees and lasting l days was encountered frequently after istration of the vermifuge. This condition have been interpreted as due to absorption oducts of decomposition of dying or dead ides, since the weakness, listlessness and xia disappeared within three days after ment.

stlessness, irritability, meningismus, para- and convulsions, symptoms usually asso- d with disturbances of the central nervous m, were encountered infrequently. Convul- were seen in 4 patients (3.2 per cent) who o disease other than ascariasis. In 1 patient acute bilateral suppurative otitis media and other with primary estivoautumnal malaria lsions were observed. Since it was not pos- to determine whether unrelated associated ses or ascariasis caused the convulsions, it s advisable to state merely that convulsions rred in 6 patients (4.8 per cent).

nce adult ascarides, when present, usually bit the lumen of the ileum, it is natural that of the symptoms encountered are referable e gastrointestinal tract. The symptoms most ently described are (1) vomiting, (2) vom- of worms, (3) passing of worms by bowel, (4) discomfort or colicky pain and (5) acute disturbances due to lodgment of parasites in the gastrointestinal tract or its associated organs. Blockage of the common bile duct and jaundice or suppurative hepatitis, acute appendicitis, hemorrhagic or suppurative pancreatitis, intestinal obstruction and perforation of the intestine or the appendix with resultant peritonitis have been reported.

Acute serious abdominal accidents leading to a fatal outcome were observed twice; reports of the autopsies have been given in detail elsewhere in this communication (cases 3 and 4). It is sufficient here to say that ascarides may wander into abnormal locations, such as the appendix, where they produce obstruction of the lumen and symptoms of appendicitis, or the common bile duct, where they produce jaundice and/or suppurative hepatitis. They may penetrate into the liver or into the pancreatic duct, producing acute hemorrhagic or suppurative pancreatitis, or may rupture the wall of the appendix or the intestine, with resulting peritonitis.

Apropos of appendicitis, it was considered advisable to review all the appendectomies performed on children during the period covered by this report in order to clarify the relation of ascariasis to appendicitis. A total of 35 appendixes removed from children were studied: None contained ascarides.

Treatment.—Of the vermifuges used in the treatment of ascariasis, hexylresorcinol seemed the safest, the most efficient and certainly the easiest to administer. Frequently it was surprising to see how soon after the beginning of treatment the children began to look brighter, became more energetic and had ravenous appetites. One child 3 years of age, who weighed 14 pounds (6.4 Kg.) on admission, gained 6 pounds (2.7 Kg.) within approximately five weeks after administration of one course of hexylresorcinol. In general, the results were all that could be desired, since when discharged from the hospital, all the patients in this series had normal stools. Treatment of this type, however, eliminates only the parasites in the lumen of the gastrointestinal tract. Larvae en route to this area are not affected. and stools of patients with migratory larvae must be examined at monthly intervals for three months and treatment administered again if ova are found. If these patients return to their original environments, the likelihood is that they will become reinfected. However, treatment does accomplish one thing: It gives these children a "new lease on life," which continues until reinfection occurs. As these children become older, they

do not seem to become infected so severely and are able to withstand infection better than younger children.

Successful treatment includes not only elimination of all worms from the patient but prevention of reinfection. Cort[5] demonstrated that ascariasis is essentially a "dooryard infection," that it is propagated by seeding of soil around houses with ova present in the promiscuous fecal discharges of small children and that these children become infected or reinfected from embryonated ova which they introduce into their mouths. The problems of ascariasis cannot be solved until sanitary disposal of feces, especially feces of small children, has been provided. Only by that means can the vicious cycle of infection, pollution of soil and reinfection be broken. Prevention is an integral part of rural sanitation, with proper disposal of feces by means of flush toilets or properly constructed latrines. There can be no adequate therapy as long as fi infection remain a constant menace. Treat of ascariasis must be directed not only t patient but to the source of infection as well.

CONCLUSIONS

A clinical survey of 125 cases of infe with Ascaris lumbricoides in children was m

Infection with Ascaris is related to contact a soil polluted with embryonated ova. Preve of the disease cannot be accomplished until tary disposal of feces, especially feces of children, has been provided. By this m contamination of soil can be reduced to a mum.

Autopsies were performed on 4 patients. the presence of Ascaris was incidental to the mary cause of death. In the remaining 2 pati however, death was due to complications resu from infection with Ascaris lumbricoides.

Abstracts from Current Literature

Anatomy and Physiology

SWEATING IN MOTION SICKNESS. ALLEN HEMGWAY, Am. J. Physiol. **141**:172 (April) 1944.

d sweating may be defined as the sweating which s without adequate thermal stimulus. It is usually ated by emotional and psychic or painful stimuli. g investigations on experimental motion sickness men as subjects it was found that cold sweating the most reliable and constant indication of the of motion sickness. During the onset of motion ess in these experiments there was little or no l stress, such as fear, anxiety or apprehension. the onset of nausea there was a certain amount scomfort which may have caused cold sweating, e cold sweating may have been a primary effect self. The symptoms of motion sickness are a, pallor, cold sweating, vomiting, drowsiness and ling of apathy, discomfort and depression. The n sickness syndrome is probably a primitive de- mechanism in which the reaction to a harmful lus is emesis. There appears to be no useful logic purpose in cold sweating, and the mecha- is probably part of a primitive defense reaction.

NOURSE, Cleveland.

SUCCESSFUL TREATMENT OF SO-CALLED "IRREERSIBLE" SHOCK BY WHOLE BLOOD SUPPLEMENTED ITH SODIUM BICARBONATE AND GLUCOSE. R. EVINE, B. HUDDLESTEIN, H. PARSKY and S. SOSINS, Am. J. Physiol. **141**:209 (April) 1944.

idosis, while not a cause of shock, is an important r in determining the reversibility of far advanced k. Its relationship to shock was noted many years and then forgotten. More recently its value as a rion of the severity of shock was emphasized by eles and Levinson, whose conclusions are con- d by the present work.

this work the criteria for production of "irreible" shock were rapid reduction of the blood pres- to 50 mm. of mercury or less and decline at a rapid rate over a period of one and one-half to hours to the lowest pressures compatible with Therapy was withheld until the carbon dioxide- ining power of the blood plasma fell to 15 volumes cent or less. In some animals this level was not reached, but it was clinically obvious that the al was at the point of death. One hundred per of such animals died when no treatment was given, only 25 per cent survived when whole blood was to replace the total amount withdrawn.

hole blood supplemented by sodium bicarbonate dextrose resulted in the survival for an indefinite d of 62.5 per cent of the dogs brought to the of so-called irreversible shock.

From the Authors' Summary and Conclusion.

[NOURSE, Cleveland.]

Biochemistry; Bacteriology, and Pathology

ULTRACENTRIFUGAL, CHEMICAL AND ELECTRON MICROSCOPIC IDENTIFICATION OF THE INFLUENZA VIRUS. J. W. BEARD, D. G. SHARP, A. R. TAYLOR, I. W. MCLEAN JR., DOROTHY BEARD, A. E. FELLER and JOHN H. DINGLE, South. M. J. **37**:313 (June) 1944.

This is a study of influenza virus A (PR8 strain), virus B (Lee strain) and swine virus. Concentration of these viruses was accomplished by adsorption and elution from red blood cells of chickens followed by ultracentrifugation or by ultracentrifugation alone. Electron micrographs of the concentrated preparations showed images of particles varying widely in size and shape but similar in structure. The evidence as to mean size and as to degree of variation in size furnished by the electron micrographs was substantiated by the ultracentifugal data. The electron micrographs showed internal differentiation within the virus particles. These findings are incompatible with the hypothesis that the influenza virus may be molecular in nature. The chemical constitution of the influenza virus is similar to that of certain bacteria in the content of protein, of fat and of carbohydrate in excess of that found in nucleic acid.

LOGAN, Rochester, Minn.

Metabolism; Infant Feeding; Milk and Other Foods

INTRAVENOUS FEEDING OF A COMPLETE DIET IN A CHILD. FRANCIS W. HELFRICK, J. Pediat. **25**:400 (Nov.) 1944.

A case of extreme malnutrition is reported on, in which the patient responded well to intravenous administration of carbohydrate, amino acids and fat emulsion. Various investigators have studied the effects of intravenous administration of dextrose, amino acids and fat emulsion, but this case seems unique in that these major nutritional elements were provided in sufficient quantity and adequate proportions over a significant period.

The child in this case was a 5 month old boy, whose condition was diagnosed as Hirschsprung's disease. He had failed to gain weight properly and at the time of his admission to the hospital weighed 4,150 Gm., just 150 Gm. more than his weight at birth. The child did not respond to treatment with atropine and continued to lose weight. He became pitifully emaciated and showed extensive loss of subcutaneous fat. When the malnutrition became so severe that it was thought he would die at any time, he was given the following preparations by means of a continuous intravenous drip apparatus: 150 cc. of 50 per cent solution of dextrose, 150 cc. of 10 per cent amigen, 180 cc. of 10 per cent fat emulsion and 120 cc. of isotonic solution of sodium chloride daily. The fat emulsion was given separately, while the remaining solutions were mixed. These materials provided 130 calories

and 150 cc. of fluid per kilogram per day. The intravenous feeding was maintained for five days, during which nothing was given by mouth. He responded unusually well, and his nutritional state improved, so that Hirschsprung's disease could be controlled with neostigmine. He was discharged seventeen weeks after admission in an excellent state of nutrition.

The success of the treatment given this child suggests that total feedings by vein can be a life-saving procedure, especially for infants who are extremely emaciated or from whom it is desirable to withhold oral feedings for an extended period.

HELFRICK, Baltimore.

Vitamins; Avitaminoses

CARDIAC INSUFFICIENCY IN THE VITAMIN E-DEFICIENT RABBIT. O. BOYD HOUCHIN and PAUL W. SMITH, Am. J. Physiol. **141**:242 (April) 1944.

The authors conclude that the sudden death of vitamin E-deficient animals in an advanced stage of muscular dystrophy is due directly to myocardial failure.

NOURSE, Cleveland.

THE EFFECT OF VARIOUS GONADOTROPIC HORMONE PREPARATIONS ON THE BLOOD PLASMA ASCORBIC ACID OF SHEEP AND RABBITS. HENRY A. LARDY, L. E. CASIDA and PAUL H. PHILLIPS, Endocrinology **35**:363 (Nov.) 1944.

Administration of gonadotropic hormone preparations is shown to reduce the amount of ascorbic acid in the blood plasma in some species of animals but not in others.

JACOBSEN, Buffalo.

Hygiene; Growth and Nutrition; Public Health

THE CARDIAC CHILD IN A SPECIAL SCHOOL. KATE H. KOHN and RUTH P. MCELDOWNEY, Am. Heart J. **28**:491 (Oct.) 1944.

The authors present data on a follow-up survey of 233 children with cardiac disease who attended a special school. The survey covered approximately ten years. Of the total number, 158 were living at the end of this period.

Of 130 children examined, 104 either had improved or had remained in the same classification since leaving the school.

The authors discuss the public health aspects of cardiac disease in children and point out the advantage of a special school for children with heart disease.

GIBSON, Chicago.

Acute Contagious Diseases

MUMPS WITH PRESTERNAL EDEMA. SYDNEY S. GELLIS and MICHAEL PETERS, Bull. Johns Hopkins Hosp. **75**:241 (Oct.) 1944.

During an epidemic of mumps of ordinary severity 502 patients were hospitalized; in 30 of these, or 6 per cent, presternal edema developed. In 25 of these patients the submaxillary gland was involved. The edema lasted from two to eighteen days. The cause is uncertain, but the condition apparently is due to lymphatic obstruction.

LYTTLE, Los Angeles.

GEORGE COLMER AND THE EPIDEMIOLOGY OF POLIOMYELITIS. ALBERT E. CASEY and ELEANOR H. H... South. M. J. **37**:471 (Sept.) 1944.

This is a brief biographic sketch of the phy... who described the first epidemic of what is pres... to have been poliomyelitis. The epidemic occurr... Louisiana. This is material which has never previ... been published.

LOGAN, Rochester, M...

MENINGOCOCCIC MENINGITIS: DEATH FOLL... WITHDRAWAL OF SPINAL FLUID. RUSSELL Bu... South. M. J. **37**:525 (Sept.) 1944.

This paper describes a 14 year old boy who b... stuporous and violent and had severe headache... stiff neck over a twelve hour period. A spinal ... ture was done, 25 cc. of cloudy fluid being with... rather rapidly. One-half hour later he was gi... grains (0.13 Gm.) of phenobarbital sodium hyp... mically. Five minutes later he became cyanotic... died.

At autopsy acute fibrinopurulent meningitis was ... There was marked intracranial hemorrhage, with ... niation of the medulla, the pons and a portion o... cerebellum into the foramen magnum.

LOGAN, Rochester, M...

Acute Infectious Diseases

RHEUMATIC DISEASES AND TUBERCULOSIS. E... LOWENSTEIN, Am. Rev. Tuberc. **49**:58 (Jan.) ...

This is a review of the literature bearing o... relation of tuberculosis to rheumatic diseases a... statement of the conclusions of the author, who... made extensive investigations in this field. In... summary he states that rheumatism is not a di... of the joints alone but of the whole mesench... Tubercle bacilli have been found after death in... blood, the heart, the spleen and the tonsils of pa... with rheumatic polyarthritis, endocarditis and ch... In the disease last mentioned they may be demonstr... easily in apparently normal spinal fluid. The ly... nodes in the neighborhood of affected joints may ... fresh tubercles and bacilli inmicrosections. As... nodules are frequently found in the hearts of tuberc... cadavers even though there is no rheumatism in... clinical history. Antibodies against tubercle bacilli... present in over 80 per cent of rheumatic patients, an... curve of sensitivity to tuberculin shows a characte... change from anergy in the first few days to hyper... during convalescence.

"These facts suggest that the occurrence and r... rence of rheumatic fever is dependent on an endog... or exogenous reinfection; superimposed infections ... mobilize sleeping foci of tubercle bacilli. The anat... appearance and the clinical symptoms may be ... plained as of allergic nature."

EUGENE H. SMITH, Ogden, Ut...

Chronic Infectious Diseases

TUBERCLE ENDOTOXOID IN THE TREATMENT OF TU... CULOSIS IN SOUTH AFRICAN NATIVES. E. GR... Am. Rev. Tuberc. **49**:1 (Jan.) 1944.

The South African native is highly susceptib... tuberculosis and when infection occurs has a ra... fatal form of the disease. The Tuberculosis Res...

nittee reports that 15 to 25 per cent of the natives yed in the Witwatersrand gold mines who have culosis are too ill to be moved; another 30 to 40 ent of patients, who are repatriated, die within months. In a series of 145 consecutive cases of culosis terminating in death in four mine hospitals verage duration of the disease was twenty-eight

Since the disease runs a natural and unlicated course in the South African native, it itutes appropriate material for study of an anticulosis treatment.

e changes following the use of tubercle endotoxoid technic of which is described) in cases of early noderately advanced tuberculosis are clearing and ic healing of the lesions, accompanied by disappearof tubercle bacilli from the sputum. In cases of advanced tuberculosis there is transformation of cute, soft, rapidly spreading type of lesion into the ic fibrocaseous or fibrotic type found in Europeans. change may proceed to clinical arrest of the disfibrotic healing and disappearance of bacilli from putum. When cavities are present partial or comocclusion often occurs. A similar favorable re- has been observed in other tuberculous conditions, as peritoneal tuberculosis and tuberculosis of the skin, lymph nodes and eyes. A series of case ts with roentgenograms are offered to substantiate laims made for the treatment described.

e exact nature and preparation of the tubercle endod used in these cases are not described in this ; however, it is prepared at the South African tute for Medical Research and is supplied free to utions engaged in similar investigations.

EUGENE H. SMITH, Ogden, Utah.

Diseases of Blood, Heart and Blood Vessels and Spleen

AL BONE MARROW INFUSIONS IN INFANCY. HERT ARBEITER and JOSEPH GREENGARD, J. Pediat. 5:1 (July) 1944.

e introduction of infusion fluids into the circulaby way of the bone marrow has only recently been gnized therapeutically. This method would seem cularly applicable to young infants, in whom the inenous route may be technically difficult. Tocantins his associates, who have published extensively on subject, reported transfusions into 11 infants by ntratibial route, with 14 successes and 15 failures attempts.

Arbeiter's and Greengard's study 43 infusions into one marrow were attempted in 34 patients, with 35 esses, 6 failures and 2 partial failures. With 1 exceptall were intratibial infusions. The technic of the proe is described in detail. A set of needles designed Dr. Harry Turkel was used, consisting of four —an outer needle with a stylet and an inner holdrill with an oversized stylet. Two sizes are able, a 3 inch (8 cm.) outer needle and a 1 inch cm.) outer needle, each 15 gage in diameter. The ion fluids used were isotonic solution of sodium ride, dextrose, lactate-Ringer solution, sulfonamide ounds, diphtheria antiserum, pneumococcus and enza bacillus antiserum, citrated normal human ma and blood.

is felt that blood given by this route should be ed. The solutions are best given by slow drip. he succesful attempts the average rate of flow for ous solutions was 2.3 cc. per minute, or 138 cc. hour, with varitations from 1 cc. to 5 cc. per minute. For plasma the average rate was 1.44 cc. per minute, with variations from 0.87 to 3.5 cc. per minute, and for blood the average was 0.88 cc. per minute, with variations from 0.60 to 2.0 cc. per minute.

The patients, with the exception of a 3 year old child, were all infants under 1 year of age. The youngest was 2 days old. No ill effects were noted in any patient. There was no evidence of infection. The failures occurred with 3 infants. One, with whom three attempts—two in the tibia and one in the femur—were unsuccessful in aspirating marrow, had syphilitic osteochondritis with a yellow, avascular marrow at autopsy. In a second infant two attempts at aspirating marrow met with failure because of difficulty in palpating landmarks due to extremely fat legs. In the third infant a first attempt failed for a similar reason, and a second attempt in this infant was only partially successful, 100 of 150 cc. of whole blood having run in during thirteen hours.

Needles have been left in place as long as four days. Periodic roentgenograms revealed a round defect in the bone after removal of the needle, which was still faintly visible after six weeks. In 1 patient there was evidence of periosteal elevation and of subperiosteal formation of bone on the thirty-third day, a result, it is believed, of a subperiosteal hemorrhage.

The only contraindications ascertained from this study are osteomyelitis and pyogenic sepsis on theoretic grounds and syphilitic osteochondritis.

GREENGARD, Chicago.

GOAT'S MILK ANEMIA. E. M. PERKINS, J. Pediat. **25**:439 (Nov.) 1944.

A case of goat's milk anemia in a 4 month old girl is reported. She was breast fed for twelve days after birth and then fed a formula of goat's milk, corn syrup and honey. On the patient's admission to the hospital her erythrocyte count was 2,730,000 and her hemoglobin level 71 per cent. Treatment for the first two weeks consisted of a cow's milk formula, cereal, cod liver oil, ascorbic acid and iron in the form of saccharated ferric oxide, 15 grains (0.97 Gm.) daily. She also received blood intramuscularly and liver soup by mouth. After she had been treated for two weeks, the erythrocyte count and the hemoglobin level had dropped still lower. Intramuscular injection of liver extract was then started, with immediate improvement in the blood picture. Two weeks after the institution of liver therapy administered intramuscularly the erythrocyte count had risen to 3,900,000 and the hemoglobin level to 84 per cent.

Literature on this subject is reviewed, including reports of experimental studies of young rats fed on goat's milk. Students of goat's milk anemia differ in their conclusions. Some believe that it is a pernicious-like form of anemia; others believe that it can be cured by the use of iron or iron and copper together. In this case it would appear that the liver extract was the important factor.

PERKINS, Rutland, Vt.

THE REACTION OF LEUKEMIC PATIENTS TO THE SULFONAMIDES. E. L. AMIDON, J. Lab. & Clin. Med. **28**:1691 (Nov.) 1943.

Four cases of lymphatic leukemia are presented. After the use of sulfanilamide and sulfathiazole all of the patients showed a decrease in the number of circulating lymphocytes, and clinical improvement occurred in all but 1 case.

WILKINSON, Galveston, Texas.

HUMAN PLASMA AND SERUM TOXICITY. DAVID STATE and MILTON LEVINE, J. Lab. & Clin. Med. **28**:1786 (Dec.) 1943.

The authors report reactions to transfusion which were due to the A and B factors in plasma and serum. Also, it is suggested that other factors may produce reactions. The authors have found cutaneous tests with plasma to be a good method of determining sensitivity.

WILKINSON, Galveston, Texas.

A SIMPLE MICROMETRIC APPARATUS FOR DETERMINING THE SEDIMENTATION RATE OF THE ERYTHROCYTES. JULIAN L. ROGATZ, J. Lab. & Clin. Med. **28**:1842 (Dec.) 1943.

The Landau apparatus for microsedimentation is described. This consists essentially of three pieces: a pipet, an aspirator and a rack. The technic, which is simple, is also described. Results are presented of the use of this apparatus on 100 patients (all children), the Smith-Cutler method being used as a control. This study demonstrates the reliability of the method, and, according to the author, this test proves that it fulfils the requirements for an ideal method.

WILKINSON, Galveston, Texas.

ELLIPTOCYTOSIS, A REPORT OF TWO CASES. MARY K. HELZ and MAUD L. MENTEN, J. Lab. & Clin. Med. **29**:185 (Feb.) 1944.

Two cases of elliptocytosis are reported. In 1 patient, a Negro infant, there was a progressive increase in the degree of elliptocytosis up to the fourth month of life. The other patient was the infant's father.

WILKINSON, Galveston, Texas.

RHEUMATIC PERICARDITIS IN EARLY CHILDHOOD. SAMUEL L. ELLENBERG and HAROLD COOK, J. Pediat. **24**:662 (June) 1944.

1. A Negro boy 2½ years of age is reported as the youngest patient on record who has recovered from rheumatic pericarditis.

2. In the early stages of the disease rheumatic pericarditis may offer a difficult diagnostic problem.

3. Oxygen and sedation proved to be more effective therapeutic agents than salicylates in making the patient comfortable.

4. The severity of the illness does not necessarily indicate a serious prognosis in rheumatic pericarditis provided the valves of the heart have not been badly damaged.

AUTHORS' SUMMARY.

SURGICAL THERAPY FOR THE PATENT DUCTUS ARTERIOSUS. ROBERT E. GROSS, New York State J. Med. **43**:1856 (Oct. 1) 1943.

The first successful operation on a patient with this condition was performed in August 1938. A sufficient number of operations for this condition have been performed to show that the procedure has a negligible mortality and that the results of the operation are good. The operation has been done on 50 patients varying in age from 11 months to 37 years.

While simple ligation has been highly satisfactory, this method fails to produce an absolute closure in some cases, and it is now considered desirable to make a complete division of the ductus. This procedure has been successfully accomplished nine times without complications. Gross considers indications for operation, diagnosis and operative procedure and reviews surgical results.

AIKMAN, Rochester, N.

EFFECT OF HIGH PROTEIN (MEAT) DIET ON MORTA FROM SURGICAL SHOCK DUE TO REPEATED HE RHAGE. ROBERT ELMAN and HARRIET W. D Proc. Soc. Exper. Biol. & Med. **56**:208 (June)

Surgical shock was produced in mongrel dog removal of 10 cc. of blood per kilogram of body w each hour. The average time of survival was and three-tenths hours for the 14 animals which been on a nonprotein diet and three and seven-t hours for the 10 animals which had been on a n diet (a Purina chow). For two groups of 10 dogs to which horse meat had been given ad libitum for and for five weeks the time of survival was four five-tenths and four and nine-tenths hours respecti The authors suggest that a diet high in protein (m might be administered as a prophylactic measur patients from whom severe, repeated loss of blood be expected.

HANSEN, Galveston, Tex

FURTHER EXPERIENCES WITH VENOGRAPHY. E. BAKER and F. A. MILLER, Radiology **43**:129 (A 1944.

The authors add to their previous reports fur experiences with venography, which at the time article was written included over 350 cases. Of consecutive patterns on roentgenograms 44 were to superficial block and only 50 to deep block; remainder were normal or inconclusive. In instances there was complete visualization of the of the entire leg, thigh and lower pelvis. The grams are classified into four types, indicating acute chronic block of the superficial and the deep plexus. authors recognize three types of venous thromb and demonstrate that there are four methods of ab mal venous return from the thigh to the body. authors describe in detail their method of injectio the contrast medium (diodrast) and the making roentgenograms.

AUSPACH, Chica

BRADYCARDIA IN CHILDREN UNDER ETHER ANESTHE H. C. SLOCUM and C. R. ALLEN, South. M. J. **37**: (March) 1944.

Of six hundred and thirty-four children recei ether anesthesia, one hundred and forty-seven sho considerable slowing of the pulse rate due to obstruc of the respiratory tract, reflex stimulation, holding the breath and overdosage of the anesthetic drug. bradycardia occurred most frequently during light gical anesthesia and in patients without proper prea thetic medication. Oxygen want could not be exclu as a contributing factor. The site of operation and age of the children did not seem to be determi factors.

LOGAN, Rochester, Min

HEMOLYTIC ANEMIA. MARION F. BEARD, South. M **37**:448 (Aug.) 1944.

A brief discussion of the phenomenon of increa destruction of blood is given. The author urges in a given case of hemolytic anemia it should be as tained if possible whether the anemia is of the genital or the acquired type. The frequency of hemol reactions following transfusions of whole blood pointed out. Use of plasma instead of whole blood produced good results. It is given daily up to 250

time. Splenectomy is recommended unless the olysis spontaneously stops or is stopped by the use lasma.

LOGAN, Rochester, Minn.

DIES IN THE ANEMIAS OF INFANCY AND EARLY HILDHOOD. H. S. BARR, Arch. Dis. Childhood **18:** 5 (June) 1943.

he regeneration of hemoglobin and the time required repair were studied in phenylhydrazine anemia, in hemorrhagic anemia and in "spontaneous anemia." he time of repair is not identical with the duration ife of erythrocytes. It does not represent the re- ration time but is the result of considerably in- sed regeneration and less considerably increased ruction.

he real regeneration in hemolytic, posthemorrhagic "spontaneous" anemia follows the kinetics of auto- lyzed reversible reactions. It is determined ex- ively by the velocity of nuclear synthesis in the ursors of the red cells.

decrease in the rate of destruction of red cells rs only in the later stages of repair and only for t periods.

he majority of erythrocytes formed at one time die ne time; some may be destroyed without regard to age, but old age is the main factor which de- ines the life span of erythrocytes.

KELLY, Milwaukee.

SMA PROTEIN VALUES IN INFANTS. EVELYN M. HICKMANS, ETHEL FINCH and EVA TONKS, Arch. Dis. Childhood **18:**96 (June) 1943.

remature infants particularly and normal full term nts up to 2 to 3 weeks of age have lower values plasma protein than do infants of from 3 weeks ge to nearly 1 year. In infants over 3 weeks old values approach closely those obtained for normal ts.

KELLY, Milwaukee.

RCTATION OF THE AORTA WITH CEREBRAL ANEU- RYSM. J. N. O'REILLY and O. W. CHAPMAN, Arch. Dis. Childhood **18:**109 (June) 1943.

case of recurrent cerebral hemorrhage in a boy of ears is described. The condition was diagnosed as to leakage from a cerebral aneurysm associated coarctation of the aorta. This diagnosis was con- ed by postmortem examination.

KELLY, Milwaukee.

SURVIVAL OF TRANSFUSED ERYTHROCYTES IN HEMOLYTIC DISEASE OF THE NEWBORN. P. L. MOLLISON, Arch. Dis. Childhood **18:**161 (Dec.) 1943.

he survival of transfused erythrocytes was estimated 21 infants with hemolytic disease of the newborn varying degrees of severity. One normal newborn nt, 1 child aged 11 months and 1 aged 15 months e also studied.

n 8 of 9 patients with icterus gravis neonatorum were given transfusions during the first fourteen s of life, Rh-positive erythrocytes were eliminated n the circulation within ten days of the transfusion. he ninth patient elimination was not complete until y days after transfusion. In 1 additional patient in m the destruction of the fetal erythrocytes was due n atypical anti-Rh agglutinin, erythrocytes contain- ing the corresponding agglutinogen were destroyed rapidly.

In 4 patients to whom Rh-positive erythrocytes were transfused after the fourteenth day of life, destruction was less rapid, and in 2 patients it was as slow as the destruction of Rh-negative erythrocytes.

Rh-negative erythrocytes transfused to 21 infants with hemolytic disease survived for not less than approximately eighty days in all but 1 instance. In the majority of the infants the rate of elimination appeared to be uniform, so that approximately 1 per cent of the erythrocytes were eliminated each day and the total time of survival appeared to be approximately one hundred days. In 5 infants, however, the initial rate of destruction appeared to be distinctly greater, and in the 1 exceptional patient mentioned above only 28 per cent of the donor cells were found to be surviving seven days after transfusion.

In 1 normal infant who received a transfusion within a few hours of birth, in 1 infant aged 11 months and in 1 aged 15 months the survival of transfused erythrocytes was estimated and was found to correspond closely with the survival of Rh-negative erythrocytes in the majority of newborn children having hemolytic disease of the newborn. This rate of survival is similar to that which has been found in adults; that is, approximately 1 per cent of the total number of transfused erythrocytes are eliminated from the recipient's circulation each day after transfusion. In all these experiments blood from adult donors was used for transfusions.

When an infant with hemolytic disease of the newborn has to receive a transfusion, Rh-negative blood of his own group is recommended when serologic tests have been made and it is fairly certain that destruction is due to anti-Rh agglutinins. Group O, Rh-negative blood is recommended when no tests have been made, and group O blood should be used when destruction is thought to be due to anti-A or anti-B agglutinins. When destruction is due to agglutinins other than atypical anti-Rh, group O blood compatible with the mother's serum is probably the safest. In every case direct matching of the donor erythrocytes against the mother's serum before transfusion seems a desirable precaution.

KELLY, Milwaukee.

CONGENITAL COMPLETE HEART BLOCK. JOHN THOMSON, Arch. Dis. Childhood **18:**190 (Dec.) 1943.

Two instances of congenital complete heart block, diagnosed antenatally, are recorded. The need for histologic examination of the heart in such cases is stressed. Attention is directed to the desirability of early diagnosis of congenital heart block.

KELLY, Milwaukee.

IMPORTANCE OF THE RH FACTOR IN OBSTETRICS. V. KRIEGER, M. J. Australia **1:**480 (May 27) 1944.

Investigations in the Women's Hospital, Melbourne, Australia, during six months (May to October 1943) detected 101 mothers with Rh-negative blood among 486 women with a previous obstetric history of miscarriage or of stillbirth. Of these mothers with Rh-negative blood pregnancy had been terminated in 40 at the time of writing. Twenty-four babies survived; 21 of them were apparently normal, and 3 recovered after having icterus gravis. There were 6 miscarriages and 8 stillbirths; 2 babies, although born alive, had icterus gravis and died.

The presence or absence of the Rh factor in the blood of 17 of the surviving babies was determined; the blood of 6 was Rh negative and that of 11 Rh positive. In 3 of the 11 babies with Rh-positive blood icterus gravis developed, and the remaining 8 may have had mild hemolytic anemia.

Tests for Rh antibodies were performed before, during and after delivery on many of the mothers with Rh-negative blood. Traces of Rh antibodies were found in some of the blood taken before delivery and in some taken at delivery, but the only appreciable number of Rh antibodies was found in blood tested during the puerperium. Among the 14 patients whose blood contained detectable Rh antibodies during the puerperium, that of 7 had a low titer, and that of the remaining 7 had a titer sufficiently high to permit the serum to be used for Rh tests. The pregnancies of those patients whose blood contained a low titer of antibodies resulted in 5 living babies, 1 stillborn child and 1 erythroblastotic child, who died. Among the results of the pregnancies during which large numbers of antibodies were detected in the mothers' blood there were 4 stillborn erythroblastotic babies, living twins (both of whom acquired jaundice and 1 of whom died) and 2 babies who acquired icterus gravis; these 2 were very ill and were given transfusions of Rh-negative blood, and both survived.

GONCE JR., Madison, Wis.

Diseases of Nose, Throat and Ear

ROENTGEN TREATMENT OF LYMPHOID TISSUE IN THE NASOPHARYNX. SYDNEY J. HAWLEY, Radiology **43**:254 (Sept.) 1944.

The object of the procedure here described was to deliver between 700 and 800 tissue roentgens on each lateral wall of the nasopharynx within eight days. The lymphoid tissue disappeared in every instance, and in only 2 of 26 patients was there a recurrence. A second course was given to the 2 patients concerned after six months and resulted in permanent relief. In 17 of 18 patients with impairment of hearing in the author's group there was improvement as measured by the audiometer. Failure resulted when only 600 r was employed.

AUSPACH, Chicago.

RADIUM TREATMENT OF NASOPHARYNGEAL LYMPHOID HYPERTROPHY. ROBERT E. FRICKA and HENRY A. BROWN, South. M. J. **37**:399 (July) 1944.

Seventy-six patients are reported on who received treatment of the nasopharynx with radium for deafness, tinnitus, coryza and severe pharyngitis and whose cases have been followed. The patients who complained mainly of deafness did not respond as well to therapy as did the others. The younger patients showed the best response to therapy. Fifty-nine per cent were definitely and permanently improved, 17 per cent temporarily improved and 24 per cent not helped.

Larger doses than those originally recommended by Crowe were tried, with improved results.

LOGAN, Rochester, Minn.

Diseases of Lungs, Pleura and Mediastinum

CONGENITAL LUNG CYST COMPLICATED BY PYOPNEUMOTHORAX. M. J. CARSON and A. WEBB JR., J. Pediat. **25**:443 (Nov.) 1944.

A 2½ month old Negro boy was first examined in the hospital. He had a history of severe respiratory distress for about thirty minutes before his admis... He was found to have a right-sided spontaneous p... mothorax with a congenital cyst in the right l... Pyopneumothorax developed, hemolytic Staphyloc... aureus being isolated from the empyema fluid. He ... treated with sulfadiazine and staphylococcus antit... Closed drainage was instituted, later followed by a ... resection and open drainage. Recovery ensued.

CARSON, Raleigh, N. C.

PROGNOSIS AND TREATMENT OF PNEUMONIA IN C... DREN. F. L. KING LEWIS, Arch. Dis. Childh... **19**:122 (Sept.) 1944.

A comparison is made of two groups of children w... pneumonia, a group of 100 who were treated be... sulfonamide compounds came into use and a grou... 127 who were treated with sulfonamide compou... The total mortality rate in the first group was 18 ... cent; in the second group treated with sulfona... compounds, 9 per cent. An attempt is made to eval... the therapeutic effect of sulfapyridine, sulfadiazine ... sulfamethazine by comparison of percentage of m... tality, response to treatment, complications and t... effects. Sulfamethazine produced the lowest morta... rate (3.7 per cent) and the quickest response to tr... ment: Sixty-three per cent of the patients treated w... this drug were apyrexial and improving within t... days, and only 7.4 per cent failed to respond wi... five days. There was no significant variation in in... dence of complications with the three drugs u... Sulfapyridine produced vomiting, rashes and renal c... plications in a few patients; sulfadiazine and sulfame... zine were not toxic for these patients. A scheme ... dosage is outlined which provides approximately ... "daily maintenance dose" for sulfapyridine and sulfa... zine of 1½ grains per pound (0.2 Gm. per kilogram) ... expected body weight per day for all ages up to ... years and for sulfamethazine of 2 grains per pound (... Gm. per kilogram) of expected body weight per d... Estimation of the blood level of free sulfamethazine ... recent cases showed a range from 3.4 mg. to 37 m... per hundred cubic centimeters. The aim was to prod... a level of 10 mg. per hundred cubic centimeters. T... optimum level is not yet established.

KELLY, Milwaukee.

Diseases of the Gastrointestinal Tract, Liver and Peritoneum

THE TREATMENT OF ACUTE GINGIVOSTOMATITIS (VI... CENT). LOUIS PELNER, Am. J. Digest. Dis. 11:... (March) 1944.

This is an excellent description of Vincent's infect... of the mouth and throat, with the historical backgro... and a discussion of the symptoms. The treatments ... reviewed to date.

The author believes this disease to have an exclusiv... infectious basis. He advocates the use of azosulfam... (disodium 4-sulfamidophenyl-2'-azo-7'-acetylamino-1'-h... droxynaphthalene-3'-6'-disulfonate) (sulfonamide deri... tive) both locally (in solution of 5 grains [0.325 G... in ½ ounce [15 cc.] each of water and of glycerin) ... by mouth (approximately ⅔ grain [0.04 Gm.] p... pound [0.5 Kg.] of body weight per day).

This article is inconclusive. Treatment by cleans... with saline solution and by administering fairly la...

s of nicotinic and of ascorbic acid has proved tive.

MORRISON, Savannah, Ga.

GASTRIC EMPTYING TIME OF MAN AT HIGH NORMAL ENVIRONMENTAL TEMPERATURES. AUSTIN HENSCHEL, HENRY LONGSTREET TAYLOR and ANCEL KEYS, Am. J. Physiol. **141**:205 (April) 1944.

ecreased appetite is frequently observed in hot ther, and there is a widespread belief that high enmental temperatures have a depressing effect on ric activity. The gastric emptying times of 17 nal young men at rest at environmental temperatures 7 to 120 F. were observed. In all but 1 of the ects the gastric emptying time was faster at the temperatures. There was an average decrease of per cent in the gastric emptying time of 12 of the ects when the temperature was 120 F. Observas on about 100 men at hard work at 120 F. failed ndicate any lack of appetite or any signs of desed gastric activity except in actual heat exhaustion.

NOURSE, Cleveland.

TEROGENOUS CYSTS AT THE ILEOCECAL JUNCTION. SIDNEY A. ROSENBURG, Ann. Surg. **119**:873 (June) 1944.

nterogenous cysts at the ileocecal junction are of inuent occurrence, but the possibility of such a lesion t be considered when a palpable mass is found in right lower quadrant in a child.

he signs and symptoms are of three varieties: (1) ptoms due to local pressure; (2) pain due to tension in the cyst; (3) symptoms due to ulcerations into lood vessel with bleeding.

he operative treatment resolves itself into four prores: (1) intestinal resection with anastomosis; (2) cleation of the cyst; (3) evacuation of the cyst; (4) rsupialization of the cyst. The author favors the last cedure and reports the case of a 6 year old child so ated.

BANTIN, Omaha.

NCREATIC FUNCTION AND DISEASE IN EARLY LIFE: I. PANCREATIC ENZYME ACTIVITY AND THE CELIAC SYNDROME. SIDNEY FARBER, HARRY SCHWACHMAN and CHARLOTTE L. MADDOCK, J. Clin. Investigation **22**:827 (Nov.) 1943.

he report summarizes the results of determinations the activity of pancreatic enzymes (trypsin, amylase lipase) and of the volume and the character of the d in the duodenal contents of infants and children, ne normal and others having chronic nutritional turbances, idiopathic celiac disease and pancreatic rosis. Pancreatic achylia was a constant and characistic finding in patients in whom postmortem examtion revealed pancreatic fibrosis; it served to ferentiate this condition from others grouped under term "celiac syndrome." Patients with idiopathic iac disease, nontropical sprue, idiopathic steatorrhea that form of the celiac syndrome which is associated h malrotation of the bowel showed no evidence of ncreatic achylia. Surgical removal of from 70 to per cent of the pancreas of infants suffering from poglycemia and from convulsions (ascribable to perinsulinism) caused an appreciable reduction in the ymatic activity of the duodenal juice but did not oduce pancreatic insufficiency.

GUEST, Cincinnati.

RESPIRATORY SHIFT IN EPIGASTRIC ABDOMINAL WALL —A PHYSICAL SIGN SEEN WITH COMPLETE UNILATERAL PARALYSIS OF THE DIAPHRAGM IN INFANTS AND CHILDREN. JACOB S. LIGHT, J. Pediat. **24**:627 (June) 1944.

A physical sign found in patients of pediatric age with complete unilateral paralysis of the diaphragm is described. Five such patients were observed. Two were young children with paralysis due to acute poliomyelitis; 2 were newborn infants with the so-called paralysis of the diaphragm in the newborn, and the fifth was an older child who had undergone a phrenicotomy for pulmonary tuberculosis. In all 5 there was apparently complete paralysis of one side of the diaphragm. This was evidenced in 4 by the finding of paradoxic movement (Kienböck's sign) on fluoroscopic study; the fifth was too sick to be moved to the fluoroscope. The sign described was observed in all of these patients and consisted of abnormal motion of the upper part of the abdominal wall, evident on inspection. With each inspiration the midepigastric region shifted to the side of the paralyzed diaphragm and to some extent also upward on that side, describing a diagonal or arciform type of movement (with the convexity of the arc downward), while with each expiration there was a shift back to the neutral position. In this movement the whole thickness of the abdominal wall, including the skin, seemed to take part, so that a bit of adhesive tape placed over the midepigastrium underwent the motion described.

It was felt that the mechanism of the sign depended on the pull exerted by the heightened inspiratory ascent of the homolateral costal margin which occurs when the diaphragm is paralyzed. The conditions under which the sign occurred or failed to occur are described. Among the important factors are age, depth of respiration, condition of the other respiratory muscles and state of the intrathoracic organs. An illustrative drawing is shown.

AUTHOR'S SUMMARY.

GONORRHEAL PERITONITIS IN CHILDREN. DANIEL L. MAGUIRE JR., J. Pediat. **24**:650 (June) 1944.

Gonorrheal disease in female children usually takes the form of a vulvovaginitis and seldom involves the upper part of the genital tract. Before puberty the vaginal epithelium is extremely susceptible to invasion by gonococci, though the cervix offers a successful barrier to the ascent of the organisms. Thus, clinically primary vaginitis in the immature is the common manifestation of gonorrheal infection. Cervicitis, salpingitis, oophoritis and peritonitis are frequent pathologic conditions in adults, but in children these infections are considered by most authors to occur exceedingly rarely.

In the typical case of gonorrheal pelvic inflammatory disease in children a history of vaginal discharge, past or present, is usually readily obtainable. There is most frequently a sudden, acute onset of generalized abdominal pain, often accompanied by chill, nausea and vomiting. The temperature rises rapidly, often to 103 or 104 F. in the first twelve hours. Pain is more acute in the lower half of the abdomen. The abdomen is rigid and scaphoid, the abdominal wall moves poorly with respiration and peristaltic sounds are usually absent. There are generalized tenderness and muscle spasm over the entire abdomen, more marked in the lower quadrants bilaterally. Rebound tenderness is exquisite and unreferred. Leukocyte counts are high,

from 20,000 to 40,000, with a marked predominance of polymorphonuclears.

Besides these abdominal and systemic manifestations, the examiner will usually discover the presence of a vulvovaginitis, acute or chronic. Typically, there will be a profuse, yellowish, purulent vaginal discharge which shows the presence of gonococci on smear with the Gram stain or on culture. The vulva is intensely reddened, edematous and excoriated, the surfaces stuck together and bathed in the purulent exudate. On rectal examination a sensation of increased heat is imparted to the examining finger, and there is extreme tenderness in both adnexae, as well as tenderness on manipulation of the cervix, but fluctuation in the cul-de-sac is seldom noted.

Conditions entering into the differential diagnosis most commonly include appendicitis, primary peritonitis (pneumococcic or streptococcic), pyelitis, intussusception, mesenteric adenitis and Meckel's diverticulitis. A vaginal discharge, past or present, particularly if it can be proved to be of gonorrheal origin, is most helpful in arriving at the diagnosis. From the practical standpoint, in the majority of instances one has to decide the origin of the peritonitis, since it is almost always obvious that the patient has peritonitis.

If it can be demonstrated that the infection is of gonorrheal or of pneumococcic origin the treatment is conservative. If, on the other hand, one feels that the process arises from an inflamed appendix the treatment may be surgical intervention. When one is in doubt and cannot rule out appendicitis, it is certainly to the best interests of the patient to explore. With appendicitis the onset is more gradual, the fever is usually not as high and comes on after the pain, the child looks less toxic, vomiting is not as prominent a feature, there is usually more tendency to localization and no vaginal discharge is present. If the abdomen is opened and salpingitis is discovered instead of appendicitis usually no harm is done, and the sulfathiazole sprinkled about in the peritoneum probably does a great deal of good in bringing about a more rapid and complete resolution of the process.

The prognosis in gonorrheal salpingitis and peritonitis is good. Under the usual treatment the patient is ordinarily clinically cured in from ten days to two weeks.

The treatment is conservative—parenteral administration of fluids, sedation and the usual supportive measures for peritonitis in general. Specifically, one gives sulfathiazole or sulfadiazine in the dose of 1 grain per pound of body weight per day. If the patient's diet is restricted to fluids administered parenterally these drugs may be administered in about the same dose intravenously (as the sodium salt), 1 Gm. dissolved in 20 cc. of distilled water. In addition, one should vigorously treat the associated vulvovaginitis, preferably with vaginal estrogen suppositories, which bring about cornification of the vaginal mucous membrane and make the area more resistant to the gonococci. Usually one estrogen suppository (10,000 international units) is inserted each day for about a week or ten days and then one every two or three days until the patient is clinically cured. The danger of sexual precocity with development of secondary sexual characteristics, even in infants, must be kept in mind if treatment is protracted. Usually 25,000 international units of estrogen is sufficient to overcome the infection.

MAGUIRE, Charleston, S. C.

THE SERUM POTASSIUM IN TWO CASES OF SP... HAROLD E. HARRISON, RALPH R. TOMPSETT ... DAVID P. BARR, Proc. Soc. Exper. Biol. & M... **54**:314 (Dec.) 1943.

In 2 adult subjects (a man 53 years old and a wo... 44 years old) with steatorrhea associated with ma... weakness and other evidence of a spruelike syndr... the potassium in the serum was found to be extre... low: 1.1 and 1.6 milliequivalents per liter respectiv... The normal range is 4.1 to 5.6 milliequivalents per li...

HANSEN, Galveston, Texa...

DUPLICATION OF THE TERMINAL ILEUM: REPORT O... CASE ASSOCIATED WITH TWO CONGENITAL DI... TICULA. EDWARD W. GROVE and LEON D. PO... South. M. J. **36**:735 (Nov.) 1943.

The case is reported of a 22 year old white man w... was operated on for suspected appendicitis. He had ... bloody stools at various times. An enterogenous c... of the ileum with acute inflammation was encounte... and in addition Meckel's diverticulum and an in... mesenteric diverticulum. Aseptic resection with end... end anastomosis was performed. The patient recover...

LOGAN, Rochester, Min...

THE TREATMENT OF CELIAC DISEASE WITH VITA... B COMPLEX AND CONCENTRATED LIVER. DON... PATERSON, MILA PIERCE and ELEANOR PECK, Ar... Dis. Childhood **19**:99 (Sept.) 1944.

The treatment of 26 patients with idiopathic c... disease and 4 patients with the celiac syndrome ... parenteral administration of liver extract and parente... and oral administration of vitamin B complex is repor...

Satisfactory gains in weight and height and improv... ment in general health were obtained in the early we... of treatment and were sustained over a period of mo... by the patients who received sufficiently intensive a... prolonged therapy.

Less dramatic improvement and less satisfact... gains in weight resulted when the liver extract adm... istered parenterally was given in conjunction with ... vitamin B complex preparation administered ora... instead of parenterally.

The children were given and thrived on a norm... balanced diet during or after the initial weeks of tre... ment. The total level of fats in the stools improv... in all but 4 patients and returned to normal in 18 ... 26 patients.

Slow improvement was commonly associated w... occurrence of infections of the upper part of the re... piratory tract.

In the secondary type of the disease the celiac sy... drome, resulting from chronic foci of infection, i... provement appeared to be hastened by intensive thera... with liver and vitamin B complex.

Vitamin A absorption curves were obtained i... patients having each type both before and during tre... ment; none of the curves returned to normal.

Oral curves for tolerance of dextrose were obtai... from patients having each type of the disease before a... during treatment; some of these curves returned ... normal.

KELLY, Milwaukee...

AL ACHALASIA WITH MEGACOLON IN CHILDREN TREATED WITH "PROSTIGMIN" [NEOSTIGMINE] AND ERGOTAMINE TARTRATE. J. MCKELL, M. J. Australia 1:465 (May 20) 1944.

The author reports the successful use of a combination of neostigmine and ergotamine tartrate in 2 cases of neostigmine alone in 1 case of megacolon. Neostigmine bromide in the form of tablets was used the dose of 3.75 to 5 mg. three times a day for dren 4 years of age, and in the dosage of 7 mg. e times daily for a girl 11 years old. The dose of otamine tartrate in the form of tablets was 0.3 mg. e times daily at 4 years and 0.5 mg. three times y at 11 years. After daily evacuations had become l established for two to three weeks the use of otamine tartrate was discontinued. Administration neostigmine was continued for several weeks; then oo was discontinued without return of the constion.

GONCE, Madison, Wis.

STROENTERITIS IN CHILDREN: A REPORT ON THE BACTERIOLOGY OF TWENTY CASES CAUSED BY BACTERIUM TYPHI MURIUM AND TEN CASES CAUSED BY BACTERIUM READING. F. DRAPER, M. J. Australia 1:533 (June 10) 1944.

The 22 infants and young children studied by the hor were patients in the Adelaide Children's Hosl during the winter of 1942. The 20 infants infected h Bacterium typhi murium (a natural pathogen of ents) usually had frequent stools as long as the perature remained elevated, a matter of five to seven eks. Three deaths occurred as a result of the ction. The common sulfonamide drugs—including faguanidine—were of no value in eliminating Bacium typhi murium from the intestine. In many tances the organism was isolated from the feces only er repeated attempts. Tetrathionate broth was a uable aid in isolating the Salmonella types found. e agglutination test with the H suspension of Bacium typhi murium was a useful diagnostic aid.

GONCE, Madison, Wis.

PORT OF TWO CASES OF CONGENITAL CYSTIC DILATATION OF THE COMMON BILE DUCT. E. K. TURNER, M. J. Australia 2:58 (July 15) 1944.

Turner describes 2 cases of congenital idiopathic atation of the common bile duct. Both the patients re young children, aged 3 and 4 years respectively, each of whom the appearance suggested acute abminal emergencies (intermittent, severe colic of the per part of the abdomen every fifteen to thirty min-s, repeated vomiting and tumor of the right side of upper part of the abdomen). In 1 case there had en no previous symptoms referable to the abdomen, d in the other there had been an intermittent comint of abdominal pain ever since the child could talk. e diagnosis was not made preoperatively in either e, chiefly because of the absence of jaundice, which the literature is said to constitute an important part the triad—abdominal pain, abdominal tumor and ndice—characteristic of choledochal cyst. In both es external drainage of the choledochal cyst was dertaken as an urgent surgical indication, in 1 case ith success.

GONCE, Madison, Wis.

HERPETIC STOMATITIS IN INFANTS AND CHILDREN. T. F. MCNAIR SCOTT, Proc. Roy. Soc. Med. 37: 310 (May) 1944.

There is a common stomatitis occurring among infants and young children that has been called by many names, such as aphthous, membranous, ulcerative or Vincent's stomatitis. The disease is due to a primary infection with the virus of herpes simplex and hence can be called herpetic stomatitis. The clinical picture of the disease is as follows: It attacks children between the ages of 1 and 6 years; the onset is sudden, with fever (the temperature may reach 105 degrees F.), anorexia and general malaise. It lasts from seven to fourteen days. The local manifestations are as follows: (1) The gums are red and spongy; (2) shallow, yellowish, painful ulcers appear on the tongue and buccal mucous membranes as a result of ruptured vesicles; (3) the regional lymph nodes are enlarged, and (4) there is a marked oral factor. There are two main types of the disease, primary and recurrent. Complications consist of (1) dehydration, (2) impetiginization of accompanying labial herpes and (3) paronychia in thumb suckers. Tests are described in the article to show the herpetic cause of the condition. Treatment is entirely palliative.

WILLIAMSON, New Orleans.

AUSCULTATION OF THE ABDOMEN. A. C. COPLEY, South African M. J. 18:194 (June 10) 1944.

Copley believes that auscultation of the abdomen is as important to the surgeon as auscultation of the chest is to the physician. In the normal abdomen, the opening and closing of the pylorus being inaudible, all the sounds normally heard are those of the small intestine —those above the umbilicus mostly from the jejunum and those below mostly from the ileum. These sounds are irregularly spaced in time, short in duration, small in volume and of medium pitch. The ileocecal valve has a characteristic sound, heard just over McBurney's point, which is more rhythmic than the sounds of the small intestine and occurs about once every forty-five seconds; this sound resembles a low rumbling squelch. The large intestine is usually silent except in the presence of an urgent desire for defecation, when prolonged rhythmic borborygmi are heard in the left iliac fossa, being longer in duration and lower in pitch than the sounds of the small intestine.

Abnormal abdominal conditions result in modification of the sounds. In the early stages of obstruction of the large intestine the borborygmi of the large bowel become loud and prolonged, but the sounds made by the ileocecal valve remain normal. In the later stages, when the small intestine begins to distend, the ileocecal valve becomes silent and the sounds of the small intestine become very frequent, higher pitched and longer in duration. Finally, when the small intestine is well distended, the normal sounds diminish and are replaced by a high pitched tinkle. In the early stages of obstruction of the small intestine the sounds of the ileocecal valve cease and the lower part of the abdomen becomes more silent, whereas in the upper part of the abdomen the sounds become more frequent and more gassy. As the obstruction goes on the sounds become progressively less frequent more tinkling and shorter in duration, and the heart sounds become more audible even as far down as the umbilicus. Early in acute appendicitis the sounds of the small intestine continue normally, but the sound of the ileocecal valve gradually becomes less and less audible. Collections of peritoneal fluids, such as blood, cause muffling of sounds, and

severely irritant fluids, such as gastric juice, cause cessation of sounds. In paralytic ileus the ileocecal valve ceases to function, and the normal sounds of the small intestine cease and are replaced by occasional faint tinkling sounds. The sound most characteristic of ileus occurs when the jejunal coils become distended and overloaded with fluid; it consists of loud transmission of the heart sounds from sternum to umbilicus.

GONCE, Madison, Wis.

Nervous Diseases

ENCEPHALITIS (WESTERN EQUINE) IN MANITOBA—1941. F. W. JACKSON, Am. J. Pub. Health **33**:833 (July) 1943.

During the summer of 1941 509 cases of western equine encephalitis, with 78 deaths, were reported in Manitoba, which has a population of approximately 700,000. The first instance occurred on July 16, and by the middle of September the epidemic was practically over. The peak occurred in the middle of August. During this same time there was an epidemic of anterior poliomyelitis. Early in the epidemic many patients with encephalitis were erroneously thought to have poliomyelitis. The attack rates were highest among children under 1 year of age and among persons between 60 and 80. The group between the ages of 1 and 20, which is usually attacked by poliomyelitis, had the lowest incidence of encephalitis. Almost half of a group of 256 patients questioned ten months after the epidemic had subjective complaints which they believed to be sequelae of the disease.

Dr. Harry Medova's study of 17 children under 1 year of age showed that 5 had definite evidence of disability, probably permanent. Dr. Medova also reported 2 instances in which a mother and a 5 day old infant acquired the disease. Both babies were completely spastic and will be permanently incapacitated.

In 1942, as a preliminary step in a study of vaccination, specimens of blood from 926 persons drawn at random from normal adult male volunteers were examined. Twenty per cent showed the presence of neutralizing bodies. Examination of specimens of blood from 40 persons in close contact with persons having encephalitis gave similar results. Approximately 3,000 of these volunteers received injections of either one dose or two doses, one week apart, of a formaldehyde-treated chick embryo vaccine. Reactions were not severe, but about 50 per cent had mild reactions. Study of a small group who had previously given negative reactions showed that two weeks after a single vaccination about 50 per cent had developed antibodies. Of another group who received 2 injections 100 per cent developed antibodies one week after the second injection.

PLATT, Rochester, N. Y.

TREATMENT OF INFLUENZAL MENINGITIS WITH SULFADIAZINE. WALLACE SAKO, CHESTER A. STEWART and JOEL FLEET, J. Pediat. **25**:114 (Aug.) 1944.

Twenty-three children with influenzal meningitis have been treated with sulfadiazine at the Charity Hospital of Louisiana in New Orleans in the past two years. Sixteen patients have been discharged as cured and have remained well except for 1 patient, who had at the time of writing residual generalized spasticity. Six fatalities occurred, all in infants under 8 months of age. In this age group only 1 recovery occurred, in an infant 4 months old. Since sulfadiazine alone does not seem sufficient in the treatment of these y infants, it is imperative that type-specific rabbit serum be given together with large doses of sulfa zine. Among older infants and children the propo of patients who recover with sulfadiazine alone is high.

Few spinal punctures and drainages were perfor

Leukopenia in 1 patient, hematuria in 1 patient drug fever in 1 patient were the only toxic condi encountered that can be attributed to the drug.

AUTHORS' SUMMA

NEUROTROPIC VIRUS INFECTIONS IN CHICAGO, 1941: NINE CASES OF LYMPHOCYTIC CHORIOMEN GITIS. ALBERT MILZER, Proc. Soc. Exper. Biol Med. **54**:279 (Dec.) 1943.

Injections of defibrinated blood, of spinal fluid of nerve tissue when possible from 75 patients various sporadic infections of the central nervous tem in Chicago were given to Swiss mice and to gu pigs. Blood serums obtained several weeks or mo after the attack were tested for the presence of n tralizing antibodies for (1) the W. E. or J. P. st of lymphocytic choriomeningitis, (2) the D.219 or H bard strain of St. Louis encephalitis and (3) the B strain of the western type of equine encephalomyel Nine of the serums gave positive reactions for lym cytic choriomeningitis. In 8 of the patients the cho meningitis virus was isolated from the spinal fluid the blood during the attack. Two of the patients w accidentally infected in the laboratory. Negative sults were obtained in the tests for St. Louis enc alitis and for western equine encephalomyelitis. Fr the clinical viewpoint, these 9 cases of lymphoc choriomeningitis are classified as follows: Five w of the encephalomyelitis type, 3 were meningeal an "influenzal," with no neurologic findings.

HANSEN, Galveston, Te

GLIOBLASTOMA MULTIFORME OF BRAIN AND SPI LEPTOMENINGES: REPORT OF A CASE. PETER M CUSE, South. M. J. **36**:823 (Dec.) 1943.

Glioblastoma multiforme occurs infrequently in c dren. The patient here reported was a 10 year Mexican boy. After several months of intermit severe frontal headaches he was brought to the hosp because of sudden inability to stand or to void. bladder was enlarged to the umbilicus, and he flaccid paralysis of the left leg and partial paral of the right leg. Sensations of pain and of cold w decreased up to the level of the umbilicus. The d tendon reflexes were absent. The Babinski reflex present on the left. He had bouts of low grade of high spiking fever. The results of two exami tions of his spinal fluid made shortly after his adm sion to the hospital were within normal limits. died four months later. At autopsy tumorous mas were found in the roof of the left lateral ventricle in the posterior part of the left frontal lobe. subarachnoid space over the base of the brain partly filled with tumorous material. The spinal c for the most part appeared liquefied. The tumor diagnosed microscopically as glioblastoma multifo

LOGAN, Mayo Clinic, Rochester, Min

OPHIC SCLEROSIS OF THE CEREBRAL CORTEX ASSOCIATED WITH BIRTH INJURY. R. M. NORMAN, Arch. Dis. Childhood **19**:111 (Sept.) 1944.

linical and pathologic details are given of 3 cases evere mental defect dating from early infancy. The tal defect of the patients in the first 2 cases was ciated with cerebral diplegia and that of the patient he third with cortical blindness. The brains showed rm of atrophic sclerosis or ulegyria affecting relay small areas of the cerebral cortex in an asymric manner. The atrophy was most marked in the l parts of the gyri and usually involved a small of the subjacent white matter. The less affected l crowns often showed partial or complete subsion into smaller microgyric convolutions, which ed to be hypermyelinated. Clearcut laminar defects he middle of the gray matter were typical features he atrophic gyri and were found radiating from the phied parts of the cortex into otherwise intact hboring convolutions. These lesions were associated thin streaks of neuroglial sclerosis and were accomed by darkly staining myelinated fibers running llel with their course.

KELLY, Milwaukee.

Diseases of the Genitourinary Tract

GENITAL AND ACQUIRED OBSTRUCTIONS AT THE VESICAL NECK IN CHILDREN. J. SYDNEY RITTER and SAMUEL E. KRAMER, New York State J. Med. **43**: 2196 (Nov. 15) 1943.

ystoscopic study of small children has been much roved in recent years. The pediatrician should be t to the possibility of congenital lesions in the ary tract when pyelitis or nephritis is suspected. genital lesions causing an infravesical obstruction lead to serious damage unless their presence is cted. Most of the malignant neoplasms of the juxtal portion of the urethra are usually due to sarmas of the prostate gland. Ritter, however, reports are subvesical periurethral sarcoma in a girl. The d was 5½ months of age when a mass was detected rnal to the anal sphincter. The uterus and the xa were normal. A sarcoma was found anterior he vagina. Two cases of obstruction due to conital valves of the male posterior urethra are reported. se are the most common congenital infravesical tructions in children. The destruction produced in upper part of the urinary tract by these valves was l demonstrated in these 2 cases, in which so much tion had occurred that little renal tissue remained. ureters were greatly dilated. The 2 children died. genital hypertrophy of the verumontanum may cause truction. Congenital contracture of the vesical neck pass unrecognized through childhood and be demonted in adult life. A lobular intrusion of a median static lobe and congenital fibrosis of the vesical neck e caused obstruction, as has a polypoid myomatous ule of the posterior urethra and prostate gland. es involving these conditions are reported.

n the discussion Meredith F. Campbell called special ntion to the importance of congenital stenosis of meatus. The ulceration, which in the past has been ributed to ammoniacal urinary irritation, must not be rlooked, because congenital stenosis of the meatus often the underlying lesion. The stenosis can be rected permanently by a simple, liberal meatotomy owed by progressive dilation. This meatotomy can n be done with advantage at the same time as the cumcision. Much dilation and destruction of the urinary tract may occur because of a small urethral orifice. Early recognition of the tight meatus and adequate treatment by meatotomy is important.

AIKMAN, Rochester, N. Y.

TREATMENT OF RESISTANT CASES OF ENURESIS BY PRESACRAL NEURECTOMY. REX E. VAN DUSEN, South. M. J. **37**:267 (May) 1944.

The author has noted a delay and impediment to urination in patients on whom a presacral neurectomy has been performed. This observation is not consistent with observations recorded by other writers. The author has noted this effect in dogs, monkeys and human beings. Four cases are reported, in 2 of which the results of treatment were good. In a third case the results were good when neurectomy was combined with muscle-transplanting procedures. In a fourth case the results were difficult to assess. Presacral neurectomy is recommended by the author when all other measures have failed and when a complete urologic examination has shown no abnormalities. Presacral neurectomy alone has not improved patients with paralysis of the detrusor muscle and the internal vesical sphincter except when used in conjunction with a plastic operation on the internal sphincter.

LOGAN, Rochester, Minn.

Diseases of the Ductless Glands; Endocrinology

THE DIURETIC ACTION OF THYROID IN DIABETES INSIPIDUS. KENDRICK HARE, DONALD M. PHILLIPS, JOHN BRADSHAW, GEORGE CHAMBERS and RUTH S. HARE, Am. J. Physiol. **141**:187 (April) 1944.

Conclusion: The administration of thyroid to dogs increases glomerular filtration and diminishes the effectiveness of posterior pituitary injection in controlling the renal tubular reabsorption of water.

NOURSE, Cleveland.

THE EFFECT OF STILBESTROL ON EXPERIMENTAL STREPTOCOCCAL INFECTION IN MICE. G. E. FOLEY and W. L. AYCOCK, Endocrinology **35**:139 (Sept.) 1944.

A number of studies in recent years have begun to draw attention to the importance of such factors as heredity, nutrition and endocrine function in susceptibility and resistance to disease. As is well known, pregnancy affects the development or progress of several diseases.

In the experiments here reported, the effect on experimental infections of injection of a substance which in itself has no bactericidal or bacteriostatic activity, namely, diethylstilbestrol, is recorded.

A single dose of 40 to 50 rat units of diethylstilbestrol rendered mice highly resistant to a dose of mouse-virulent hemolytic streptococci which regularly killed normal control mice of the same age and sex. The results of postmortem bacteriologic examination suggest that protection was afforded by some diethylstilbestrol-induced factor which interfered with the spread of hemolytic streptococci in mice.

JACOBSEN, Buffalo.

THE PITUITARY RESPONSES OF MATURE MALE RATS TO AN OXIDATIVE INACTIVATION PRODUCT OF ESTRONE. O. WATKINS SMITH, Endocrinology **35**:146 (Sept.) 1944.

Experiments with Westerfeld's lactone, an oxidative inactivation product of estrone, have revealed that this

compound causes, in much smaller doses, the same release and stimulation of the gonadotropic and adrenotropic factors of the anterior pituitary glands of mature male rats as estrone itself. It is concluded that estrone exerts these effects indirectly, through formation of the lactone or some similar compound.

JACOBSEN, Buffalo.

THYROID AND METATHYROID DIABETES. B. A. HOUSSAY, Endocrinology **35**:158 (Sept.) 1944.

The influence of the thyroid gland on pancreatic diabetes and on the endocrine function of the pancreas in dogs was studied from the physiologic and pharmacologic points of view. It was found that prolonged administration of thyroid does not produce diabetes in a dog with an intact pancreas. It does produce it in a dog which has only a fragment of pancreas left after subtotal pancreatectomy but which has a normal level of blood sugar. Previous treatment with anterior pituitary or thyroid sensitizes these animals to the diabetogenic action of thyroid. Diabetes so produced may be temporary or permanent, according to the amount of damage done to the islets. Insulin protects the islets during the first stages; later it is no longer efficient.

Diabetes can be induced after removal of the gonads, the thyroid glands and the adrenal medulla. It cannot be obtained in hypophysectomized and adrenalectomized dogs because they die in a state of hypoglycemia when given the thyroid.

This type of diabetes has the same characteristics as pancreatic diabetes.

In dogs no type of diabetes is modified by thyroidectomy.

JACOBSEN, Buffalo.

INFLUENCE OF REPRODUCTIVE HORMONES ON GROWTH IN OVARIECTOMIZED AND NORMAL FEMALE RATS. RALPH BOGART, JOHN F. LASLEY and DENNIS T. MAYER, Endocrinology **35**:173 (Sept.) 1944.

Estrone injected into either normal or ovariectomized female rats retards the growth rate, whereas progesterone accelerates it.

JACOBSEN, Buffalo.

ABSORPTION OF SUBCUTANEOUSLY IMPLANTED HORMONE PELLETS. MICHAEL B. SHIMKIN, EGON LORENZ, ROSE WYMAN and SUE GRAY NORTON, Endocrinology **35**:283 (Nov.) 1944.

The decrease in rate of absorption of subcutaneously implanted pellets of an estrogen or androgen is due to the change in surface area, which depends on the change in volume. In order to maintain an approximately constant level of dosage for a protracted period, it is necessary to implant additional pellets at regular intervals.

JACOBSEN, Buffalo.

EFFECT OF TESTOSTERONE PROPIONATE ON THE BODY WEIGHT AND SKELETAL SYSTEM OF HYPOPHYSECTOMIZED RATS: SYNERGISM WITH PITUITARY GROWTH HORMONE. MIRIAM E. SIMPSON, WALTER MARZ, HERMANN BECKS and HERBERT M. EVANS, Endocrinology **35**:309 (Nov.) 1944.

Under varying experimental conditions testosterone has caused both increased and decreased body growth in experimental animals. It has been commonly assumed that the effects of estrone on body weight were mediated through the pituitary gland. It is possible that the effects of testosterone are also mediated through the pituitary gland.

The experiments here reported were devised to determine, by using hypophysectomized rats as test animals, whether testosterone has a direct effect on body weight and skeletal growth. It was found that testosterone propionate did not cause a significant increase in body weight or skeletal dimensions in hypophysectomized male rats. There was evidence, however, that osteogenesis did not become quiescent, as it did in controls. Increase in body weight and increase in skeletal dimensions in hypophysectomized male rats into which pituitary growth hormone had been injected were augmented by simultaneous injection of testosterone propionate.

JACOBSEN, Buffalo.

CHEMICAL STUDIES ON MELANOGENESIS IN NORMAL AND ADRENALECTOMIZED RATS. HERBERT J. SPIES and ELAINE P. RALLI, Endocrinology **35**:325 (Nov.) 1944.

These studies show that adrenalectomy not only reverses the achromotrichia produced in black rats by diets deficient in the filtrate factors but results in an increase in the extractable melanin of the hide. Both the adrenal cortex and sodium chloride are involved in the metabolism of melanin.

JACOBSEN, Buffalo.

THE ANTERIOR PITUITARY AND ITS RELATION TO THE ADRENAL CORTEX IN WATER DIURESIS. SAMUEL JOSEPH, MALVINA SCHWEIZER, NAOMI Z. ULLMAN and ROBERT GAUNT, Endocrinology **35**:338 (Nov.) 1944.

It is well known, particularly from work on diabetes insipidus, that the anterior lobe of the pituitary gland contributes to the control of water exchange by exerting a diuretic influence. Experiments here reported indicate that hypophysectomized rats show a greatly delayed diuretic response to water. There is delay in absorption of water given orally, but the principal cause of the delay in diuresis lies in inability to excrete normally water that is absorbed. The deficiency is not repaired by administration of an anterior pituitary extract or of thyroxin but is repaired by administration of small doses of adrenal cortex extract or desoxycorticosterone. These observations suggest that the delay is due to adrenal cortical deficiency and support the value of water diuresis tests in the clinical diagnosis of mild adrenal insufficiency.

JACOBSEN, Buffalo.

ALLOXANTIN AS A DIABETOGENIC AGENT IN RABBITS. OSCAR KOREF, LUIS VARGOS JR., F. H. RODRIGUEZ and A. TELCHI, Endocrinology **35**:391 (Nov.) 1944.

Intravenous injection of alloxantin produces diabetes mellitus in rabbits.

JACOBSEN, Buffalo.

Skin Diseases; Allergy

HEREDITARY ECTODERMAL DYSPLASIA: REPORT OF A CASE WITH EXPERIMENTAL STUDY. ZACHARY FELSEN, Arch. Dermat. & Syph. **49**:410 (June) 1944.

A case report is presented of a 17 year old boy who had combined defects of hair, teeth and sweat glands. The family tree of this patient shows sex-linked inheritance, with male patients and female conductors. In a heat chamber the body temperature of the patient rose rapidly, whereas the body temperature of normal persons did not change.

McINTOSH, Iowa City.

NICILLIN THERAPY OF IMPETIGO CONTAGIOSA AND ALLIED DISEASES: USE OF PENICILLIUM-INOCULATED DRESSING. HAROLD M. JOHNSON, Arch. Dermat. & Syph. **50**:1 (July) 1944.

The absence of local reaction and sensitivity together h its potent bactericidal action makes penicillin an l agent for topical therapy in the treatment of pyo- mas. The author treated with topical applications of icillin a total of 25 patients who had common cutane- infections; 12 of the patients had impetigo con- iosa. The infections were controlled in about half length of time required for controlling similar infec- s by topical use of sulfonamide preparations.

McINTOSH, Iowa City.

URIGO OF HEBRA (SEVERE TYPE). BEN KANEE, Arch. Dermat. & Syph. **50**:113 (Aug.) 1944.

This extremely rare condition is characterized by et during infancy, persistence into and through adult more frequent occurrence in men and aggravation ing the winter months. The eruption is of a charac- stic type, composed of shotty papules coming out crops accompanied by intense pruritus, and shows dilection for the extensor surfaces of the extremities. e author presents a typical case involving an 18 year youth. The eruption first appeared when the patient 6 years old.

McINTOSH, Iowa City.

NNECTIVE TISSUE NEVUS. KARL STEINER, Arch. Dermat. & Syph. **50**:183 (Sept.) 1944.

A comprehensive review of the literature reveals that 37 cases of connective tissue nevus have been re- ted. The ages of the patients ranged from 10 months 69 years. The case of a 5½ year old girl with a nective tissue nevus located laterally on the chest resented.

McINTOSH, Iowa City.

SKERATOSIS CONGENITA WITH PIGMENTATION, DYS- TROPHIA UNGUIUM AND LEUKOPLAKIA. JOHN GARB and GDALI RUBIN, Arch. Dermat. & Syph. **50**:191 (Sept.) 1944.

The authors describe the cases of 2 brothers with a drome characterized by patchy pigmentation of the , extensive leukoplakia of the oral mucosa and trophy of the finger nails and toe nails. The lesions e first noted when the patients were about 12 years Three other cases have been reported in the litera- . It is the authors' belief that this disease is ilial and probably congenital.

McINTOSH, Iowa City.

NTGEN STUDIES OF THE HEART IN ASTHMATIC CHIL- DREN. VINCENT J. DERBES and HUGO T. ENGEL- HARDT, J. Pediat. **25**:394 (Nov.) 1944.

To determine whether asthma causes heart disease in dren asthmatic children were studied roentgenologi- y. After a preliminary fluoroscopic examination roent- ograms at a distance of 2 meters (6.5 feet) were taken. e transverse diameter of the great vessels and the longi- nal and broad diameters of the heart were measured. ese data were correlated with results obtained by pre- tion formulas. All results were within normal limits. s concluded that uncomplicated bronchial asthma is a factor in heart disease. This conclusion does not tate against the probability of production of heart ase by pulmonary fibrosis, emphysema, bronchiectasis and other pulmonary complications seen in the chronic asthmatic state.

AUTHORS' SUMMARY.

ECZEMA VACCINATUM. FRANK C. COMBES and HOWARD T. BEHRMAN, New York State J. Med. **43**:2283 (Dec. 1) 1943.

A man 24 years of age who had been treated for folliculitis of the bearded portion of the face contracted vaccinia from 2 children in the family. The patient had extensive lesions but recovered. The diagnosis was confirmed by the Paul test. In this test material from the lesions is placed in scarified areas of a rabbit's eye. In thirty-six hours the cornea shows minute elevations which cannot be wiped off. The eye is then enucleated. A variola-infected cornea shows isolated or confluent white, opaque elevations characteristic of the disease. Histologic examination also shows the presence of Guarnieri bodies.

AIKMAN, Rochester, N. Y.

OBSERVATIONS ON THE IMMUNOLOGY OF POLLEN HAY FEVER: A CRITICAL REVIEW. OSCAR SWINEFORD JR., South. M. J. **37**:342 (June) 1944.

This paper is a critical review of the recent literature with particular reference to the role of the sensitizing antibodies and of the thermostable blocking antibodies.

LOGAN, Rochester, Minn.

Surgery and Orthopedics

FRACTURES OF THE FEMUR IN CHILDREN. W. P. BLOUNT, A. A. SCHAEFER and G. W. FOX, South. M. J. **37**:481 (Sept.) 1944.

This is a study of 281 cases of fracture of the femur which have been followed for eight years at the Milwaukee Children's Hospital. Most of the fractures were of the middle third of the femur. Conservative treatment by traction is recommended. Careful application of the apparatus and careful observation of the patient are essential. Normal alinement is necessary, but bayonet apposition may be more desirable than normal apposition. An average overgrowth of the fractured bone of ½ inch (1.27 cm.) may be expected, although there are wide variations. Open operation is recommended only for fracture at the epiphysis.

LOGAN, Rochester, Minn.

PENICILLIN IN SURGERY. W. A. ALTEMEIER, South. M. J. **37**:494 (Sept.) 1944.

This is a report of early work done at the University of Cincinnati. Six of the 10 patients reported on in detail were children. Intravenous, intramuscular, intrathecal and intrapleural routes, as well as topical application, were used in administering the penicillin. The drug has been successfully used in the treatment of infections caused by the staphylococcus (except resistant strains and those complicated by acute vegetative endocarditis), gas gangrene bacillus, actinomycosis and Streptobacillus moniliformis. Infections caused by the streptococcus and the gonococcus also respond to penicillin.

The author describes 6 patients having acute osteomyelitis who received early intensive penicillin therapy and for whom surgical intervention was unnecessary.

A table of organisms respectively susceptible to and resistant to penicillin in vitro is included.

LOGAN, Rochester, Minn.

Miscellaneous

THE LASHLEY QUADRUPLETS. JAMES W. BRUCE and E. P. SCOTT, J. Pediat. **25**:447 (Nov.) 1944.

The authors give a résumé of the birth, feeding and development of the Lashley quadruplets. They are Kentucky's only living set of quadruplets.

SCOTT, Louisville, Ky.

DEATHS FROM SULFONAMIDES: A CLINICAL AND PATHOLOGIC STUDY, WITH A REPORT OF THREE CASES. C. N. GESSLER, South. M. J. **37**:365 (July) 1944.

The pathologic observations in 3 cases in which administration of sulfonamide compounds resulted in death are presented. The patient in 1 of these cases was an infant. In 1 case, in addition to tubular nephritis, myocarditis and visceral focal necrosis, a previously undescribed interstitial pneumonitis with formation hyaline membrane was found. Thirty cases from literature are reviewed. Uremia and agranulocyt are the most frequently reported lethal complicatio

LOGAN, Rochester, Minn.

THE POTENTIAL DANGER OF THE TOPICAL USE SULFATHIAZOLE: REPORT OF SIXTEEN CASES SENSITIZATION TO SULFATHIAZOLE. FRANCIS ELLIS, South. M. J. **37**:493 (Sept.) 1944.

This is a report on 16 patients thought to be sensiti to sulfathiazole administered either locally or internall Fifteen of the patients reacted positively to patch te for sulfathiazole ointment; 1 was not tested. The pos bility of sensitizing patients to sulfathiazole by indi criminate use of this compound is emphasized.

LOGAN, Rochester, Minn.

News and Comment

GENERAL NEWS

Physicians Certified by American Board of Pediatrics.—The following physicians were certified by the American Board of Pediatrics after the examinations in New York on March 29, 30 and 31, 1945: Dr. Olga E. Allers, Brookline, Mass.; Dr. Ben Arbor, New York; Dr. Hans Behrendt, New York; Capt. John Lincaid Brines, Eglin Field, Fla. (formerly Wellesley, Mass.); Dr. Ethel G. Cermak, Albany, N. Y.; Dr. Joseph Alfred Costa, Bedford Hills, N. Y.; Dr. Robert Downing Cox, Worcester, Mass.; Dr. Leon N. Goldenberg, Brooklyn; Dr. Daniel C. Hackett, Elizabeth City, N. C. (formerly Riverdale, N. Y.); Lt. Comdr. Robert Morton Ganz, Cambridge, Mass. (formerly Boston); Capt. Paul Theodore Hahman, Camp Crowder, Mo. (formerly San Francisco); Dr. Olga Haller, Newark, N. J.; Dr. Sarah Hooker Hardwicke, New York; Dr. Elizabeth B. Hinckley, New York; Dr. Elizabeth A. Jackson Ittner, Brooklyn; Dr. Dorothy Steinle Jaeger, Washington, D. C.; Dr. Herman B. Katzman, Brooklyn; Dr. Vincent de Paul Larkin, New York; Dr. Henry Foster Lee, Philadelphia; Dr. Virginia Catherine Lent, Hempstead, N. Y.; Dr. Luigi Luzzatti, New York; Lt. James H. Maroney, Annapolis, Md. (formerly Summit, N. J.); Lt. Leonard Montag, Fort Miles, Del. (formerly Port Arthur, Texas); Dr. Dario Morelli, Lakefield, Mass.; Dr. Francis Pizitz, New York; Dr. Ralph Lewis Prowda, Syracuse, N. Y.; Dr. Benjamin Owen Ravenel, Charleston, S. C.; Dr. William Lacy Ramsey Jr., Elizabeth, N. J.; Dr. William Morris Schmidt, Washington, D. C.; Dr. Lois M. Smedley, Forest Hills, N. Y.; Dr. John Hostley Soady, Asheboro, N. C.; Dr. Jack Tepper, Xenia, Ohio; Dr. Clara Waldinger, Jamaica Plain, Boston; Dr. David Louis Weinstein, Washington, D. C.; Dr. Dorothy Vermilya Whipple, Washington, D. C.; Lt. Louis Arnold Wikler, Jacksonville, Fla. (formerly Philadelphia).

At this examination 54 candidates were examined; 36 were passed and certified; 17 failed, and 1 was conditioned in Growth and Development.

Masters Theses to Be Available to Industry.—Research data of immense importance, much of which is buried in the many departments of the technical schools and universities, are being unearthed for the first time. Masters theses are now being made available to industry. Information which is not easily accessible is being made available in carefully indexed form.

Through the cooperation of the leading technical schools and universities, masters theses that are of importance to industry and research will be indexed in the technical "Digest-Index" issued by the National Research Bureau, Inc., 415 North Dearborn Street, Chicago 10, Ill. The theses will be supplied on microfilm through the Library of Industrial Research, a nonprofit organization, acting as clearing house for the exchange of technical, scientific and management information. Many of the leading firms in the United States and Canada are members of the library.

Fee for Taking Examination of American Board of Pediatrics.—After May 1, 1945 the fee for taking the examination of the American Board of Pediatrics will be $75.

Book Reviews

Clinical Practice in Infectious Diseases. By E. H. R. Harries, M.D., F.R.C.P. London, D.P.H., Medical Superintendent, Northeastern Hospital (London County Council), and M. Mitman, M.D., M.R.C.P. London, D.P.H., D.M.R.E., Medical Superintendent, River Hospitals. With a foreword by W. Allen Daley, M.D., F.R.C.P. London, D.P.H., Medical Officer of Health, London County Council. Second edition. Cloth. Price, $6.00. Pp. 570, with 52 illustrations and 22 tables. Baltimore: The Williams and Wilkins Company, 1944.

In the second edition of this work the increase in size of some hundred pages does not completely represent the amount of new material. The authors explain that further additions were made possible by omission of several tables which appeared in the first edition and by a more economical arrangement of type.

The book is for students, practitioners and medical officers. Its contents provide a fund of information not commonly assembled in one volume. The thirty-eight chapters treat not only the common and many of the less common acute infectious diseases but also their management and control in the hospital. Others relate to "Infection and Resistance," "Hypersensitiveness, Allergy, Anaphylaxis and Serum Reaction," and "The Transmission of Infectious Diseases." There are four chapters pertaining to various aspects of diagnosis and one concerning "Epidemiology and Control of Infectious Diseases." It is outstandingly apparent that the opinions expressed are supported by clinical experience of unusual breadth.

The importance of clinical diagnosis is stressed, in contradistinction to mere laboratory examination. Therapeutic measures of a controversial nature are discussed decisively. Instead of a summary at the end of each chapter, there is a synopsis at the beginning; there are references at the close. Twenty-six tables and fifty-two figures, two of the latter in color, are of illustrative value. A well arranged index completes the book.

Too much praise cannot be bestowed on the authors. Their work will receive its fullest appreciation from those who have devoted themselves to diagnosis, management and control of acute infectious diseases in large hospitals.

La mortinatalidad y la mortalidad neonatal en Caracas. By Pastor Oropeza, Dario Curiel and Espiritu S. Mendoza. Pp. 160, with 16 plates. Caracas, Venezuela: Editorial Grafolit, C. A., 1944.

In this small textbook, written in Spanish, are discussed the mortality for infants and the newborn in Caracas and the diseases and treatment of the premature and the newborn infant.

Directory of Pediatric Societies *

INTERNATIONAL

International Association of Preventive Pediatrics

President: Prof. S. Monrad, Dronning Louises Børnehospital, Copenhagen, Denmark.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

International Congress of Pediatrics

President: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
Secretary-Treasurer: Dr. Charles F. McKhann, University Hospital, Ann Arbor, Mich.
Canadian Committee:
Chairman: Dr. Alan Brown, Hospital for Sick Children, 67 College St., Toronto.
Secretary: Dr. H. P. Wright, 1509 Sherbrooke St. W., Montreal.
Place: Boston. Time: Postponed indefinitely.

International Congress for the Protection of Infancy

Secretary: Prof. G. B. Allaria, Corso Bramante 29, Torino 120, Italy.

FOREIGN

Argentine Pediatric Society of Buenos Aires

President: Dr. Martin Ramón Arana, 1809 Rodriguez Peña, Buenos Aires.
General Secretary: Dr. Alfredo Larguia, Cerrito 1179, Buenos Aires.

Associação Paulista de Medicina, Section on Pediatrics

President: Dr. Vicente Laro.
First Secretary: Dr. Armando de Arruda Sampalo.
Second Secretary: Dr. Luiz Augusto de Toledo, Av. Brigadeiro Luiz Antonio 393, 1° Andar, São Paulo, Brazil.
Time: Twelfth of every month, 8:30 p. m.

British Paediatric Association

President: Prof. L. G. Parsons, 58 Calthorpe Rd., Five Ways, Birmingham.
Secretary: Dr. Donald Paterson, 27 Devonshire Pl., London, W. 1.

Danish Pediatric Society

President: Dr. E. Lenstrup, Copenhagen.
Secretary: Dr. E. Gjørup, Dronning Louises Børnehospital, Copenhagen.

Nederlandische Vereeniging voor Kindergeneeskunde

President: Dr. J. H. G. Carstens, Servaasbolwerk 14a, Utrecht.
Secretary: Dr. R. P. van de Kasteele, Laan van Poot 340, 's Gravenhage.
Place: Different places. Time: Three times a year.

Paediatrický Spolok na Slovensku

President: Dr. A. J. C. Chura, Lazaretská 11, Bratislava
Secretary: Dr. P. Rados, Lazaretská 6, Bratislava.
Place: Pediatric Clinic, University Bratislava. Time: Six times year.

Royal Society of Medicine, Section for the Study of Disease in Children

President: Dr. E. A. Cockayne, 98 Harley St., London W. 1, England.
Secretary: Dr. R. Lightwood, 86 Brook St., London W. 1, England.
Place: 1 Wimpole St., London. Time: Fourth Friday of each month, 4:15 p. m.

Palestine Jewish Medical Association, Section of Physicians of Children's Diseases

President: Prof. S. Rosenbaum, 26 Bialkstr., Tel Aviv
Secretary: Dr. A. Brünn, 9 Maazestre, Tel Aviv.

Sociedad Cubana de Pediatria

President: Dr. Angel A. Aballí Arellano, 17 No. 6 Vedado, Habana.
Secretary: Dr. Julio G. Cabrera Calderin, Hospital Mercedes L y 21 (Vedado), Box 2430, Habana.
Place: Cátedra de Clinica Infantil, Hospital Mercedes Habana. Time: Last Wednesday of every month.

Sociedad Mexicana de Pediatria

President: Dr. Fernando López Clares, 12/a. Medellín 191, Mexico.
Secretary: Dr. Jesus Gómez Pagola, Versalles 6 Mexico.

Sociedad de Pediatría de Santiago de Cuba

President: Dr. Antonio Beguez Cesar, Sagarra 1 Santiago de Cuba.
Secretary: Dra. Susana Texido Vaillant, Padre Pi 57, Santiago de Cuba.

Sociedad Venezolana de Puericultura y Pediatr

President: Dr. E. Santos Mendoza.
Secretary: Dr. P. Oropeza, Hospital de Niños, Caraca

Société de Pédiatrie de Paris

President: Dr. B. Weill-Hallé, 49 Avenue Raymond Poincaire, Paris, France.
Secretary: Dr. Jean Hallé, 10 bis Rue Pré aux Clercs Paris, France.
Place: Hôpital des Enfants Maladies, 49 Rue de Sèvre Time: 4:30 p. m., third Thursday of every month

Uruguyan Society of Pediatrics

President: Dr. José Alberto Praderi, Eduardo Acevedo 1132, Montevideo.
Secretary: Dr. Héctor Fossatti, Durazno 1882, Montevideo.

NATIONAL

American Medical Association, Scientific Assembly, Section on Pediatrics

Chairman: Dr. John Aikman, 184 Alexander St., Rochester, N. Y.
Secretary: Dr. Gilbert J. Levy, 188 S. Bellevue Blvd., Memphis, Tenn.
In compliance with the request of the Office of Defense Transportation and in the interest of the national war effort a meeting will not be held in 1945.

* Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

American Academy of Pediatrics

sident: Dr. Joseph S. Wall, 1864 Wyoming Ave. W., Washington, D. C.
retary: Dr. Clifford G. Grulee, 636 Church St., vanston, Ill.

American Hospital Association, Children's Hospital Section

irman: Dr. Joelle C. Hiebert, 299 Main St., Lewis-n, Maine.
retary: Dr. W. Franklin Wood, McLean Hospital, Waverly, Mass.

American Pediatric Society

sident: Dr. James L. Gamble, 300 Longwood Ave., oston.
retary-Treasurer: Dr. Hugh McCulloch, 325 N. uclid Ave., St. Louis.

Canadian Society for the Study of Diseases of Children

sident: Dr. R. R. Struthers, 906 Drummond Medical ldg., Montreal.
retary-Treasurer: Dr. Elizabeth Chant Robertson, ospital for Sick Children, Toronto.

Society for Pediatric Research

sident: Dr. Edward M. Bridge, 219 Bryant St., uffalo, N. Y.
retary: Dr. Mitchell I. Rubin, 1740 Bainbridge St., hiladelphia 46.

SECTIONAL

Intermountain Pediatric Society

sident: Dr. Robert Alway, University of Utah School Medicine, Salt Lake City 2.
retary-Treasurer: Dr. L. Paul Rasmussen, 1020 oston Bldg., Salt Lake City 1.
ce: Salt Lake City General Hospital. Time: First hursday of each month, 8 p. m.

New England Pediatric Society

sident: Dr. Warren R. Sisson, 319 Longwood Ave., oston.
retary-Treasurer: Dr. James Marvin Baty, 1101 eacon St., Brookline, Mass.
ce: Boston Medical Library. Time: Four meetings year, occurring from September to May.

North Pacific Pediatric Society

sident: Dr. M. L. Bridgeman, 1020 S. W. Taylor t., Portland, Ore.
retary: Dr. C. G. Ashley, 833 S. W. 11th Ave., ortland, Ore.

Northwestern Pediatric Society

sident: Dr. Arild E. Hansen, University of Minne-ta, Minneapolis.
retary-Treasurer: Dr. Albert V. Stoesser, 205 W. niversity Hospital, Minneapolis.
ce: Minneapolis, St. Paul, Duluth and Rochester. ime: January, April, July and October.

Rocky Mountain Pediatric Society

sident: Dr. G. R. Fisher, 23 E. Pikes Peak Ave., olorado Springs, Colo.
retary: Dr. Joseph H. Lyday, 1850 Gilpin St., enver.

Southern Medical Association, Section of Pediatrics

Chairman: Dr. William Weston Jr., 1428 Lady St., Columbia, S. C.
Secretary: Dr. Angus McBryde, 604 W. Chapel Hill St., Durham, N. C.

STATE

Alabama Pediatric Society

President: Dr. Amas Gipson, 948 Forrest Ave., Gadsen.
Secretary-Treasurer: Dr. Ruth Berrey, 2021–6th Ave. N., Birmingham.

Arizona Pediatric Society

President: Dr. Vivian Tappan, San Clemente, Tucson.
Secretary: Dr. Hilda Kroeger, Arizona State Health Dept. (Maternal and Child Welfare Division), Phoenix.

Arkansas State Pediatric Association

Chairman: Dr. C. B. Billingsley, 1425 N. 11th St., Fort Smith.
Secretary: Dr. R. E. Weddington, 1425 N. 11th St., Fort Smith.

California State Medical Society, Section on Pediatrics

Chairman: Dr. William C. Deamer, University of California Hospital, San Francisco.
Secretary: Dr. Charles W. Leach, 2000 Van Ness Ave., San Francisco.

Florida State Pediatric Society

President: Dr. Ludo Von Meysenbug, Box 3356, Daytona Beach.
Secretary: Dr. Robert Blessing, 409 Blount Bldg., Ft. Lauderdale.
Place: Concurrent with state association meeting at time of convention.

Georgia Pediatric Society

President: Dr. T. F. Davenport, 104 Ponce de Leon Ave. N. E., Atlanta.
Secretary-Treasurer: Dr. Don F. Cathcart, 478 Peachtree St. N. E., Atlanta.

Hezekiah Beardsley Pediatric Club of Connecticut

President: Dr. Edward T. Wakeman, 129 Whitney Ave., New Haven.
Secretary: Dr. Herman Yannet, Southbury Training School, Southbury.
Time: Three meetings a year.

Illinois State Medical Society, Section on Pediatrics

Chairman: Dr. Craig D. Butler, 715 Lake St., Oak Park.
Secretary: Dr. A. J. Fletcher, 139 N. Vermilion, Danville.

Indiana State Pediatric Society

President: Dr. K. T. Knode, 1105 E. Jefferson Bldg., South Bend.
Secretary-Treasurer: Dr. Mathew Winters, 621 Hume Mansur Bldg., Indianapolis.
Time: Two meetings a year.

Iowa Pediatric Society

President: Dr. Mark L. Floyd, Children's Hospital, Iowa City.
Secretary-Treasurer: Dr. James Dunn, Davenport Bank Bldg., Davenport.

Medical Society of State of New York, Section on Pediatrics

Chairman: Dr. A. Clement Silverman, 608 E. Genesee St., Syracuse.

Secretary: Dr. Albert G. Davis, 307 Gas and Electric Bldg., Utica.

Medical Society of the State of Pennsylvania, Pediatric Section

Chairman: Dr. Elwood W. Stitzel, 403 Central Trust Bldg., Altoona, Pa.

Secretary: Dr. P. F. Lucchesi, Philadelphia Hospital, Philadelphia.

Michigan State Medical Society, Pediatric Section

Chairman: Dr. Charles F. McKhann, University Hospital, Ann Arbor.

Secretary: Dr. Mark F. Osterlin, Central Michigan Children's Clinic, Traverse City.

Mississippi State Pediatric Society

President: Dr. Harvey F. Garrison Jr., 315 E. Capitol Pl., Jackson.

Secretary: Dr. Guy Verner, 126 N. Congress St., Jackson.

Nebraska Pediatric Society

President: Dr. John L. Gedgoud, University of Nebraska Hospital, Omaha.

Secretary-Treasurer: Dr. Gerald C. O'Neil, 640 City National Bank Bldg., Omaha.

Place: As announced by committee. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

New Hampshire Pediatric Society

President: Dr. MacLean J. Gill, 14 N. State St., Concord.

Secretary-Treasurer: Dr. Ursula G. Sanders, 46 Pleasant St., Concord.

Time: Twice yearly.

North Carolina Pediatric Society

President: Dr. Arthur H. London, 1105 W. Main St., Durham.

Secretary: Dr. Jay M. Arena, 604 W. Chapel Hill St., Durham.

Oklahoma State Pediatric Society

President: Dr. Ben H. Nicholson, 301 N. W. 12th St., Oklahoma City.

Secretary: Dr. Luvern Hays, 108 W. 6th St., Tulsa.

Place: Oklahoma Club. Time: 6:30 p. m., fourth Friday of each alternate month from September to May, inclusive.

South Carolina Pediatric Society

President: Dr. Lonita Boggs, 301 E. Coffee St., Greenville.

Secretary-Treasurer: Dr. Hilla Sheriff, Wade Hampton Office Bldg., Columbia.

Texas Pediatric Society

President: Dr. F. H. Lancaster, 4409 Fannin St., Houston.

Secretary-Treasurer: Dr. John E. Ashby, 3610 Fairmount Ave., Dallas.

Virginia Pediatric Society

President: Dr. L. E. Sutton Jr., Medical College Hospital, Richmond.

Secretary: Dr. Emily Gardner, 1100 W. Franklin, Richmond.

West Virginia State Medical Society, Section on Pediatrics

President: Dr. Andrew Amick, 1021 Quarrier, Charleston.

Secretary: Dr. A. A. Shawkey, Professional Bl, Charleston.

LOCAL

Academy of Medicine of Cleveland Pediatric Section

Chairman: Dr. J. W. Epstein, 10515 Carnegie A, Cleveland.

Secretary: Dr. Virginia Barker, City Hospital, Cleveland.

Place: Cleveland Medical Library Bldg. Time: tober, December, February and April.

Academy of Medicine, Toronto, Section of Pediatrics

President: Dr. I. Nelles Silverthorne, 170 St. Ge St., Toronto, Canada.

Secretary: Dr. G. P. Hamblin, 2333 Bloor St. Toronto, Canada.

Bronx Pediatric Society

President: Dr. Jacob H. Turner, 121 W. 197th New York.

Secretary: Dr. Harry S. Pizer, 1726 Davidson A New York.

Place: Concourse Plaza Hotel, 161st St. and G Concourse. Time: Second Wednesday of each m except June, July, August and September.

Brooklyn Academy of Pediatrics

President: Dr. Kenneth G. Jennings, 159 Midwood Brooklyn.

Secretary: Dr. Joseph Battaglia, 713 Bushwick A Brooklyn.

Place: Granada Hotel. Time: Fourth Wednesday each month except May, June, July, August September.

Buffalo Pediatric Society

President: Dr. A. Wilmot Jacobsen, 187 Bryant Buffalo, N. Y.

Secretary: Dr. Richard A. Downey, 786 Forest A Buffalo, N. Y.

Place: Children's Hospital, 219 Bryant St. Time: p. m., first Monday of each month from Septe to June.

Central New York Pediatric Club

President: Dr. Edward J. Wynkoop, 501 James Syracuse.

Secretary Dr. Frank J. Williams, 58 S. Swan Albany.

Places: Various cities in New York. Time: T Tuesday of April and September.

Chicago Pediatric Society

President: Dr. Morley D. McNeal, 2 N. Sheridan Highland Park, Ill.

Secretary: Dr. Henry G. Poncher, 1819 W. Polk Chicago.

Place: Children's Memorial Hospital, 710 Fulle Ave. Time: Third Tuesday of each month, Oct to May, inclusive.

Cincinnati Pediatric Society

ident: Dr. Lloyd K. Felter, 3144 Jefferson Ave., ncinnati.
etary: Dr. T. Selkirk, 3530 Reading Rd., Cincinnati.
e: Children's Hospital, Elland Ave., Cincinnati.
me: On call.

Dallas Pediatric Society

ident: Dr. Robert A. Knox, 3701 Fairmount Ave., llas 4, Texas.
etary-Treasurer: Dr. Gladys J. Fashena, 4585 Bel- rt Pl., Dallas 4, Texas.
e: Children's Medical Center. Time: 1 p. m., second d fourth Saturdays of each month.

Detroit Pediatric Society

ident: Dr. John J. Pollack, 650 Maccabees Bldg., troit, Mich.
etary: Dr. Philip J. Howard, 2799 W. Grand Blvd., troit, Mich.
e: Wayne County Medical Society. Time: 8:30 m., first Wednesday of each month from October June, inclusive.

Fulton County Medical Society, Pediatrics Section (Atlanta, Ga.)

irman: Dr. Don F. Cathcart, 478 Peachtree St. E., Atlanta.
etary: Dr. Harry Lange, 478 Peachtree St. N. E., tlanta.
e: Academy of Medicine, 38 Prescott St. N. E.
me: Second Thursday of each month from October April, 8 p. m.

Houston Pediatric Society

ident: Dr. Raymond Cohen, 2300 Caroline St., ouston, Texas.
etary: Dr. Betty Moody, 526 Richmond Rd., ouston, Texas.
e: College Inn, Houston. Time: Fourth Monday each month.

Kansas City (Missouri) Pediatric Society

ident: Dr. Edwin H. Schorer, 1103 Grand Ave., ansas City.
etary: Dr. H. E. Petersen, Kirkpatrick Bldg., St. oseph, Mo.
e: Kansas City General Hospital. Time: On call.

Los Angeles County Medical Association, Pediatric Section

ident: Dr. Milo B. Brooks, 1033 Gayley Ave., West os Angeles.
etary-Treasurer: Dr. Elena Boder, 1830½ Lucille ve., Los Angeles 26.
e: Los Angeles County Medical Headquarters, 1925 ilshire Blvd. Time: Second Monday of February, pril, June, October and December.

dical Society of the County of Kings and the Academy of Medicine of Brooklyn, Pediatric Section

ident: Dr. Abraham M. Litvak, 1145 Eastern Park- ay, Brooklyn.
etary: Dr. Harold Levy, 750 St. Marks Ave., rooklyn.
e: 1313 Bedford Ave., Brooklyn. Time: 9:00 p. m., urth Monday of each month, October to April, clusive.

Medical Society of the County of Queens, Inc., Section on Pediatrics

Chairman: Dr. Meyeron Coe, 217-02-91st Ave., Queens Village, N. Y.
Secretary-Treasurer: Dr. Edith A. Mittell, 144-38th Ave., Flushing, N. Y.
Place: Queens County Medical Bldg., Forest Hills, N. Y. Time: Third Monday of October, January, March and May.

Medical Society of the District of Columbia, Section on Pediatrics

President: Dr. Harry A. Spigel, 2647 Connecticut Ave., Washington, D. C.
Secretary-Treasurer: Dr. Perry W. Gard, 2520 Woodley Rd., Washington, D. C.
Place: Medical Society Bldg., 1718 M St. N. W. Time: 8 p. m., fourth Thursday of every month.

Memphis Pediatric Society

President: Dr. F. T. Mitchell, 376 S. Bellevue Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. Harry Jacobson, 1193 Madison Ave., Memphis, Tenn.
Place: John Gaston Hospital. Time: Quarterly.

Milwaukee Pediatric Society

President: Dr. M. G. Peterman, 411 E. Mason St., Milwaukee 2.
Secretary-Treasurer: Dr. B. J. Malnekoff, 3213 N. Marietta Ave., Milwaukee.
Place: Milwaukee Athletic Club. Time: Second Wednesday of each alternate month, beginning with February.

New York Academy of Medicine, Section of Pediatrics

Chairman: Dr. Howard Craig, 175 E. 79th St., New York.
Secretary: Dr. Alfred E. Fischer, 73 E. 90th St., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

Northern California Pediatric Society

President: Dr. John Mott Rector, 2000 Van Ness Ave., San Francisco.
Secretary: Dr. George Bates, 490 Post St., San Francisco 2.
Time: Four times yearly.

Oklahoma City Pediatric Society

President: Dr. William M. Taylor, 1200 N. Walker St., Oklahoma City.
Secretary: Dr. G. R. Felts, 625 N. W. 10th St., Oklahoma City.
Place: Oklahoma Club. Time: Third Thursday of each month.

Philadelphia Pediatric Society

President: Dr. Carl Fischer, Greene and Coulter Sts., Germantown, Philadelphia.
Secretary: Dr. Sherman Little, 1740 Bainbridge St., Philadelphia.
Place: College of Physicians, 19 S. 22d St. Time: Second Tuesday in January, March, May and November.

Pittsburgh Pediatric Society

President: Dr. John D. Sturgeon Jr., 22 N. Gallatin Ave., Uniontown, Pa.
Secretary-Treasurer: Dr. C. J. Stoecklein, Medical Arts Bldg., Pittsburgh.
Place: Pittsburgh Academy of Medicine. Time: Second Friday, alternate month from October to June, inclusive.

Richmond Pediatric Society

President: Dr. Stanley Meade, 913 Floyd Ave., Richmond, Va.
Secretary-Treasurer: Dr. Louise Galvin, 214 S. Boulevard, Richmond, Va.
Place: Richmond Academy of Medicine, 1200 E. Clay St. Time: 8 p. m., third Thursday of each month, except June, July and August.

Rochester Pediatric Society

President: Dr. Herbert Soule, 122 Rutgers St., Rochester, N. Y.
Secretary-Treasurer: Dr. Jerome Glaser, 300 S. Goodman St., Rochester, N. Y.
Place: Rochester Academy of Medicine or arrangement by program committee. Time: Third Friday of each month from October to May.

St. Louis Pediatric Society

President: Dr. Peter G. Danis, 634 N. Grand Ave., St. Louis 3.
Secretary-Treasurer: Dr. H. Ewing Wachter, 3720 Washington Ave., St. Louis.
Place: St. Louis Medical Society Bldg. Time: Third Thursday of each month from November to June.

Seattle Pediatric Society

President: Dr. Frederick B. Joy, Stimson Bldg., Se
Secretary: Dr. Sherod M. Billington, Medical D Bldg., Seattle.
Place: College Club. Time: Third Friday of month from September to June at 6:30 p. m.

Southwestern Pediatric Society

President: Dr. Jeanette Harrison, 1136 W. 6th Los Angeles.
Secretary: Dr. Henry F. Gallagher, 1930 Wil Blvd., Los Angeles.
Place: Jonathan Club of Los Angeles. Time: Wednesday in January, March, May, September November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. Campbell Harvey, 35 W. Huron Pontiac, Mich.
Secretary: Dr. Harry A. Towsley, University of M igan, Department of Pediatrics and Communic Diseases, Ann Arbor, Mich.

Westchester County Medical Society, Pediatric Section (New York)

President: Dr. John B. Ahouse, 27 Ludlow St., Yon N. Y.
Secretary-Treasurer: Dr. Elvira Ostlund, 64 High Rd., Rye, N. Y.
Place: Grasslands Hospital, Valhalla, N. Y. Th Third Thursday in October, December, February April.

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